



FRIDAY, JULY 28, 1893.

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Contributions.

60-Ft. Plate Girder—Correction.

NEW YORK, July 20, 1893.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your issue of July 7th you publish a plan of a 60-ft. plate girder built by us. In this plan the web is marked $\frac{1}{2}$ in. thick. The actual thickness of the web for this span is $\frac{3}{8}$ in.

UNION BRIDGE CO.

The "Nancy Hanks" Express

Central Railroad and Banking Company of Georgia,
SAVANNAH, Ga., July 17, 1893.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In the article on page 501 of your issue of July 7, 1893, I notice in the table showing certain high-speed trains that the "Nancy Hanks" of this system is not mentioned. Since this is one of the most rapid trains in the United States, I beg to call your attention to the attached official schedule, from which you will notice that train No. 1 leaves Savannah at 7 a. m., reaching Atlanta at 1:45 p. m., and train No. 2, leaving Atlanta at 1:30 p. m., reaches Savannah at 8:15 p. m., covering a distance of 294 miles in six hours and three-quarters, allowing within this time a 15-minute stop to each train at Macon, a loss of four minutes running through the yard in Atlanta, and loss of approximately five minutes running through the yard at Macon, and with fifteen intermediate stops. There is embraced in the sixteen stops the time to get coal and water at Macon and water at three intermediate stops, from ordinary seven-inch tank valves. The record of this train for six months shows about two-thirds of the time directly on time, and the remainder within fifteen or twenty minutes of schedule, with the exception of one slight derailment caused by improper bearing on front engine truck, and some four or five cases of broken eccentric straps.

The maximum curvature over this line is five degrees and maximum grade 30 ft. We use pine cross ties, 7 x 10 in., 8 ft. long; steel rails, 68½ and 63½ lbs. per yard.

We run one nineteen and eleven and two twenty and twelve Baldwin compound engines on this train, and use in emergency an 18-in. simple engine, which makes the time but does not quite maintain the record of the compounds on account of the loss of time in getting coal and water. This train carries a combination mail and baggage car, a partition car, a first-class coach and a sleeping or parlor car, while we have made the run equally well with a fifth through Pullman sleeper for some 30 days past, but which has now been taken off on account of the through line not paying. The average consumption of coal and water is as follows: 40 to 79.41 miles to the ton of coal, making an average of about 60 miles, and from 40 to 41 gallons of water to the mile run.

Our parlor cars are equipped with fans between ventilators, which are run by wire cord around the axle of the car, with excellent success up to this time, and which are specially adapted to our warm climate.

T. C. McNEELY, Superintendent.

A reasonable deduction for the time consumed in stops and in traversing the distances mentioned at Macon and Atlanta leaves the rate of speed in motion 52.4 miles an hour. The Baldwin compound loco-

tives referred to in the foregoing letter weigh 49 and 52 tons, respectively, as follows:

	49-ton engine.	52-ton engine.
Diam. of driving wheels	61 in.	69 in.
Weight, in working order	33,740 lbs.	105,060 lbs.
Weight on driving wheels	60,440 lbs.	65,430 lbs.
Diam. H. P. cylinder	11½ in.	12 in.
Diam. L. P. cylinder	19 in.	20 in.
Stroke	24 in.	24 in.

Accounting on the Western Maryland.

Western Maryland Railroad Company,
BALTIMORE, July 25, 1893.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Under the caption, "Organization of the Accounting Department" there appeared in the *Railroad Gazette* of last week a communication which would have been well enough had it stopped short of its personal conclusion.

As it stands, it is not only in part untrue, but likewise unjust and offensive; I refer to its reference to the Western Maryland Railroad Company. The statement that this company had been assisted from time to time by Baltimore city, and that the city practically owned the road is correct, but the statement that as the city had received no dividends, etc., it became dissatisfied, and in November last appointed a Commission to investigate the financial and physical condition of the road is not correct as to the "dissatisfaction."

The Commission was not the outgrowth of such dissatisfaction, but was appointed through the powerful political influence of certain other railroad interests to operate at the city's expense to depreciate the city's own property to facilitate its advantageous acquisition by these other railroad interests.

I had felt it my duty to oppose the numerous schemes which had been made for several years to wrest this public property from its rightful owners, the people, and by the aid of the people acting through their business organizations and supported by a loyal press, each of these schemes was in turn defeated. This of course had the opposite effect from endearing me to the scheme promoters, and feeling that an obstacle to their plans might be removed by showing some dereliction or worse upon my part, the investigation was pushed relentlessly under its hostile chairman and his willing expert. They were given the fullest opportunity and all possible assistance to get to the bottom of everything. It was soon found, however, that the management had at least been honest and that every dollar taken in during a period of nearly 20 years was properly accounted for.

Reporting this, however, was not going to depreciate the property nor lessen public estimation of the management, and the only remaining expedient, that of getting up a hue-and-cry as to the mode of accounting, was hit upon, and I think under all the circumstances, greatly overdone. No credit is given for the correct auditing of the traffic accounts with the large number of connecting roads, nor for correctly reporting receipts from local business and of expenditures of the several departments.

Unfortunately, a former treasurer, who, by the way, had the reputation of being one of the best accountants this city ever produced, and I believe as upright a man, concluded to publish a balance sheet with his annual report. In showing the indebtedness, he took no account of some \$3,000,000 interest paid for the company by the city under certain indorsements of bonds. The city had forgiven the Pittsburgh & Connellsville Division of the Baltimore & Ohio and the Northern Central road such debts, and it seemed to him a natural presumption that the Western Maryland would receive like consideration, hence this dead wood was not piled up in the balance sheet. To show that this was to some extent pardonable, I would state that a prominent finance commissioner of this city said that "this dead wood should be cleared away," and the company's credit improved to this extent.

I confess that I knew that increased indebtedness could be shown by including this interest, but not being ambitious in that line and knowing it would never be demanded nor paid, I may have concurred that it was useless to show it. The city had gone into the railroad business this time, as it had gone in before, knowing that it would lose something directly for an indirect gain. Why then deceive the city by including in our reports what we did not expect to pay? This information was published annually in the city's own reports, which in turn were published in the daily papers, so that there was no secret of the city paying interest for the company, nor lack of information as to the amount.

As a matter of fact, the city is now being indirectly paid by the \$80,000,000 annual trade furnished by the road, and the people are well satisfied with this result. It is only these other railroad interests that are so considerate for the Baltimore taxpayer.

How the \$226,530 of funding certificates due the city got on the wrong side of the balance sheet was a puzzle to me, and it was when I asked an explanation of the present Treasurer that he replied that he had only followed his predecessor, who had doubtless placed it there through some misunderstanding of the nature of the item, so this correction was made by the company before the creation of the Commission.

Again, "the city was credited on the books with a loan of \$1,800,000 which should have been \$1,704,000." This confusion doubtless arose from the city ordinance authorizing \$1,800,000. The actual expenditure was

made by the city and not by the company in redeeming maturing obligations.

The operation extended through several years and doubtless the misunderstanding arose through these peculiar conditions, that is, the entry was doubtless made when it was expected the whole appropriation would be used.

I was not aware until the Commission's report, that the books of the Treasurer did not show the issue of \$324,000 preferred stock. This was doubtless due to no proceeds coming into the Treasury, the stock being issued to the Commissioners of Washington County in an adjustment between the city, the county and the company. These discrepancies are bad enough, but they were not intentional and consequently not for the purpose of deceiving.

I feel that I am in a measure to blame for not seeing that the Treasurer had enough clerical assistance to relieve him of sufficient detail work to enable him to give proper attention to his books. The order, however, was for economy, and I was looking for reductions, and not increases.

While this property has but 235 miles of line against 93 miles twenty years ago, its earnings have increased nearly 1.070 per cent. This has been so gradual, however, that there has been no sudden change to fix a time for the establishment of a general accounting department, and I think we might have gone a year or two longer with our present economical methods, but in deference to the Commission, we are proceeding to carry out its recommendations upon this point, and will appoint a General Auditor as soon as the necessary enlargement to our office building, now in course, is completed.

In this community the report of the Commission is considered a full vindication of the management, and this is emphasized by the unfriendly tone of the report and the total absence of a disposition to whitewash or even recognize merit. It is common talk that no Commission ever missed a better opportunity to do justice.

When the present management took charge the company had 91 miles of run-down, poorly equipped road, which cost about \$50,000 per mile. It now has 235 miles, the new mileage averaging about \$15,000 per mile. The Western Maryland is located between two trunk lines and can justly claim that while its track may not be as good as the better of these, it is better than that of the other, while its motive power will average better than that of either. A speed of 60 miles per hour may be safely maintained upon every portion of the line with the exception of a practically abandoned six-mile branch. When Mr. Wm. P. Shinn made his examination of the road we attached the poorest engine he found to his special and worked out a mile to the minute on the rails.

"Accountant" quotes the Commission as fixing the value of this property at \$3,734,193.31, but omits the words that accompany, as follows: "This is without any regard to the benefit that may possibly be derived in the future from the net earnings of the branch lines." And the Commission might have added that the above estimate was based on the operations of 1891, though it had the reports for the more prosperous year of 1892 then before it, which were as yet uninfused by the operations of a valuable connection opened at the close of 1892. The Commission should also have added that some of the branch properties were not only earning six per cent. dividends, but surpluses in addition.

I fully recognize that there must be a responsible head in all railroad or other large operations, at whose door blame may justly be laid for all shortcomings; but as a matter of fact, when a man is performing all the duties of president, general manager and chief engineer, it is scarcely practicable for him to run 50 locomotives, grease 1,000 cars, weigh and load the freight and keep the books.

In the case of the company which had most to do with having the Western Maryland investigated for its purposes at the city's expense, corresponding duties to mine are divided between a president, a vice-president, an assistant to the president, a general manager, an assistant general manager and a chief engineer, and yet a learned judge, in a recent announcement of a decision affecting the company with this large executive staff, in using the following words: "and while it is charged that the books have not been kept in the most approved manner of railroad bookkeeping, yet the testimony of . . . and . . . and . . . clearly establish that the system is entirely intelligible," etc., would seem to make it apparent that none of these six persons can be giving very close attention to books.

In its physical features, the Western Maryland differs from most roads, for while heavy grades and sharp curvature are the rule, two of its lines join at the summit of the Blue Ridge, making three ascents to the summit. It fairly startles our passengers to tell them at Mechanicstown that their locomotive will lift itself with the six coaches and 300 passengers five times the height of the Washington Monument (Baltimore) within the next 25 minutes. If you were to say 1,000 ft., they would have no appreciation of the work.

Again, its terminal arrangements are complicated and expensive, and when it is considered that several miles of tracks are used in common with several hundred preferred trains, and that trains separating on the summit of the Blue Ridge must not only make their single track

meeting points on both lines, but must strike gaps upon the terminal road through tunnels, etc., to suit the two sets of trains, one running upon a 24 mile longer route than the other with the necessary reverse movements from the city, it is believed that unfavorable operating conditions exist here which cannot be appreciated, at least upon the straight and level roads of the South and West. The effect of this is seen in the following: Of the last 15 engines purchased, 14 are consolidations, weighing 126,000 lbs. each without water and fuel and exclusive of tender.

I neglected to state above that under the organization of this company the supervision of the Treasurer's accounts is intrusted to a committee of the Board of Directors.

The company runs upon its main line and branches about 100 schedule passenger and freight trains daily except Sunday, besides handling half-a-million excursion passengers in the summer months, and its heaviest freight business, that between the Baltimore & Ohio, Philadelphia & Reading and Norfolk & Western roads, by extras. The regular train service in the summer season includes six express trains and eight through passenger trains, run from 75 to 100 miles each per day. These trains have to reach the city on the minute, or lose their rights on common tracks, while the outward service is necessarily affected by any irregularities of the trains of other companies using common tracks, necessitating a great amount of train dispatching upon this single track system.

I merely mention these matters to show that the management here has an exceptionally difficult property to handle, and that the auditor would have to keep his own wheel up in handling the accounts, not only of the parent company, but of its dozen auxiliaries.

J. M. HOOD,
President.

The New Sixth Street Bridge, Pittsburgh, Pa.

[WITH AN INSET.]

We illustrate in this issue a fine example of a roadway bridge in the new Sixth street bridge recently completed at Pittsburgh. The Sixth street crossing of the Allegheny River, extending from Sixth street, in Pittsburgh, to Federal street, in Allegheny, has been for many years the principal thoroughfare between these two cities. The first bridge at this point was a wooden structure, built in 1819. This was replaced with a wire suspension bridge in 1838 by Mr. John A. Roebling. This was a fine structure for its day, but of late years has not been equal to the traffic demands. It consisted of two full or river spans and two half or anchorage spans, making the total length between anchorages about 1,044 ft. It was 40 ft. wide, giving a roadway of 20 ft., and two sidewalks 8 ft. between cables, but narrowed to 7 ft. at the towers. It was supported by four cables over cast iron towers, the two main cables coming down between the roadway and sidewalks and two smaller ones outside of the handrails; the flooring was of plank laid lengthwise of the bridge.

The bridge was not designed for the heavy traffic that now exists on the streets of two such important manufacturing cities as Pittsburgh and Allegheny. Then necessarily the vehicle traffic, including a very heavy streetcar service, was compelled to move at slow speeds by being confined to a single stream each way on a roadway but 20 ft. wide. The demands for a more rapid transit for the streetcars and light vehicles, and for a structure capable of carrying the heavy loads customary in an iron city, rendered a new bridge desirable.

In January, 1891, Mr. Theodore Cooper was appointed engineer of the Allegheny Bridge Company, who own this bridge (all the bridges over the Allegheny and Monongahela rivers at Pittsburgh are toll bridges under state charters), and directed to take the proper steps to replace the then existing bridge by a more modern structure, suitable for the heaviest traffic, and without any necessity for restriction of speed, other than ruled upon any public street. The new bridge was to occupy approximately the location of the old bridge, and must be erected without interrupting, to any great extent, the existing traffic. The Secretary of War having control over the Allegheny River at this point by recent Act of Congress, plans were prepared to meet his approval for the piers and approaches.

The old piers and abutments were not suitable for the new structure, but, as the centre pier of the old bridge had governed the location of the channel piers of the newer bridges farther up the river, it became imperative to locate the new centre pier as close to the old one as was practicable. The foundation of the old pier consisted of six courses of timber, the top course being exposed at low water; for the new foundation it was thought best by the engineer to go about eight feet deeper. As the river bottom at this point was sand and gravel with old rip-rap that had been deposited from time to time about the old pier, it was considered safe to locate the new pier west of the old pier, and so that there would be 10.5 ft. between the foundation timbers of the new and old piers.

The location of the centre pier being determined, it was found that two equal spans of 445 ft. between centres of piers would give the most satisfactory results, fully spanning the ordinary channel and leaving approaches sufficiently long to continue the established

grades of Sixth and Federal streets up to the desired floor elevation.

The new bridge consists of a masonry approach at the Pittsburgh end 105 ft. long, pierced with two semi-circular arch openings of 28 ft. span; two main river spans, 445 ft. between centres of piers; one shore span, 48.5 ft. over the Pittsburgh & Western Railroad on the Allegheny shore, and the Allegheny masonry approach, which is the anchorage masonry of the old wire bridge with a new coping course added to correspond to the other new masonry. The new bridge, while approximately occupying the location of the old bridge, has been swung down stream at the Pittsburgh end some 6 ft. in order to bring it in direct line with the street, the old bridge having been built, for some reason or other, that much to one side of the centre line.

Upon completion of the masonry plans, and approval of the general plans by the Secretary of War, the contract for the masonry and foundations was let to the Drake & Stratton Company, limited. In founding the centre pier, sheet piles were driven along the base of the old pier to prevent the flow of material from beneath it, while dredging the excavation for the caisson of the new pier. The bottom of the new foundation is 7.6 ft. below the old one, that being found to be as far as it was safe to go, the sand beginning to flow from under the old pier at this depth, but not sufficiently to do any harm. All masonry for the new bridge which could be built without removing the old bridge was completed during the summer and fall of 1891.

The roadway over the whole structure is 40 ft. wide between curbs, with a clearance between the trusses of 41 ft. and 9 in. to give room for the hubs of the wheels. The sidewalks are 10 ft. wide over the approaches and 9 ft. clear of the end posts over the river spans. The river spans were required to have, when erected in place, a true parabolic camber over the whole structure with a centre rise of 4 ft., this making a curve tangent at the ends to the approach grades.

As the contract of the bridge company with the street car company required that a cable conduit should be provided for operating its lines by cable, provision was made for these conduits, but as the car company was operating its lines satisfactorily by the trolley system, no conduits were put in, though provision was made for their introduction at any future time when needed.

Special specifications were prepared by the engineer for the superstructure, but each bidder was "allowed to select his own form of truss, subject to the requirements of the specifications." It was also stated in the invitation for proposals that "economy of material, construction or erection will not be allowed to outweigh the general effect of the completed structure as to graceful and pleasing outlines and proportions." Under this invitation the design and bid of the Union Bridge Company was accepted as the best.

To reduce the risks of erection and the possibilities of interference with the bridge traffic, it was required that the superstructure should be erected during the low water season of 1892. At this season there is very little river traffic, and consent was obtained to trestle the river under both spans, leaving one 60-ft. opening for navigation. This enabled the contractors for the erection, Messrs. Baird Bros., to block up the old bridge floor from the trestle bents to a proper height to clear the new floor. The existing traffic being thus provided for, the traveler for erecting the new trusses was set up and used to take down the cables and towers of the old bridge. The trestle bents were extended upstream far enough to provide a new footwalk clear of the new work, so as to avoid all risks to the foot traffic, and also to keep the crowd from interfering with the work of erection. During the erection the directors of the bridge company, of their own motion, suspended all vehicle traffic other than street cars, to avoid possible trouble from runaway teams. The street cars, being operated entirely by trolley, were readily taken care of, and were seldom blocked for more than a few minutes at a time. In fact, from being allowed to run at high speed for most of the time, they were given better facilities than they possessed on the old bridge. One block of about an hour and twenty minutes, while changing tracks, was the only one of any account during the change from the old to the new bridge; this was a small matter when the amount of shifting necessary to get in the new floor, with its paving and new car tracks, and to change from the old tracks to the new, is considered.

The trusses of the new bridge are shown on the inset. They are bowstring trusses, 439 ft. 3 in. centre to centre end pins, 79 ft. deep at the centre, with centre to centre of trusses being 44 ft. 6 in. The same sheet shows one half-section at the centre of the bridge and a half end elevation. The floor beams are suspended from the lower chord pins; the longitudinal stringers are belled plate girders, resting on the top flanges of the floorbeams, two of them under the middle of each car track being spaced 18 in. centres, to provide for the cable conduits, if ever required. The whole floor for both roadway and sidewalks is covered with buckle plates, firmly riveted to the stringers. The gutter stringer is carried above the roadway, and has along its top flange a cast iron curb, made in short sections and attached for ready removal when broken or worn. The spaces in the trusses between footwalks and roadway are covered with plates fitting about the truss members, and so sloped that they make a continuation of the sidewalk

paving, thus adding to the effective width of the sidewalks, and draining all water to the roadway gutters. The outer footwalk stringer is made extra deep to support the handrailing and fascia. At the centre of each panel scuppers are placed along the gutters for drainage and at the centre of the roadway, between the car tracks, manholes for dropping snow or sweepings are provided. Hydrants are placed in line of the trusses for washing or sprinkling the roadway. Ornamental lamps are placed on the handrail over the piers and abutments, but the lighting is mainly by arc lights suspended from the cross struts.

The street car tracks, 5 ft. 2 in. gauge and 8 ft. 8 in. centre to centre, occupy the middle of the roadway leaving on each side a clear space of 12 ft. for other vehicles. The rails are of the grooved pattern, and are secured to wrought steel chairs riveted to the buckle plates.

The footwalks are formed of three-quarters of an inch Seyssel asphalt upon 2 in. of coal tar binder; they slope 2 in. in 10 ft. toward the roadway.

The roadway buckle plates were covered with concrete not less than 4 in. thick at the gutters and crowning 4 in. at the centre; the upper surface was required to be troweled to a true surface and crown. Upon this was laid a wooden block paving, without the use of any sand or other filling; the blocks were unseasoned white oak, 5 in. deep, 3½ in. wide, and from 8 to 10 in. long; the blocks were not allowed to vary more than ¼ of an inch from 5 in.; two spacing nails were driven into one side of each block for spacing them with joints of ⅜ in.; spaces 2 in. wide along each gutter were filled with clay to provide for the expansion of the blocks; the open spaces between the blocks were then filled with cement grout, all recesses in the street car rails, scuppers and so forth were squared up with cement mortar, so as to provide a square bearing and avoid all fitting of the blocks. The pavement over the approaches is similar to that of the adjacent streets, Ligonier stone blocks laid on a concrete base. The contract for paving was let to Mr. George L. Peabody, of Pittsburgh.

The handrailing, lamps and fascia were made by the Jackson Architectural Iron Works, of New York, from designs furnished by Mr. Cooper.

The specifications required that the floor should be proportioned for a live load of 100 lbs. per square foot and a 30-ton load on two pair of axles 10 ft. apart; the main trusses for 80 lbs. per square foot over the whole structure. In addition to the weight of metal in the structure, a dead load of 40 lbs. for each square foot of sidewalk and 130 lbs. for each square foot of roadway must be provided for. This weight of paving was required in order to provide for the substitution at some future time of a stone or other paving of same thickness as the wooden one at present adopted, if found desirable.

The superstructure is of steel, and is for "character of material and allowed strains" in accordance with the requirements of Cooper's Highway Bridge Specifications. The total weight of metal in each of the main spans is about 3,305,000 lbs., and weight of present paving at about 1,800,000 lbs. The total cost of the work is about \$560,000.

The resident engineer was Mr. W. G. Wilkins, of the firm of Wilkins & Davidson, of Pittsburgh.

Roberts's Perforated Deflecting Plate.

The illustrations show a deflecting plate for locomotive smokeboxes, designed and considerably used by Mr. E. M. Roberts, Superintendent of Motive Power of the South Carolina Railroad. The objects sought to be attained and the results are given below, chiefly in Mr. Roberts' language. Statements which we have seen from a number of engineers on that road, employed in passenger, freight and switching service, bear out all that Mr. Roberts claims for the use of his device.

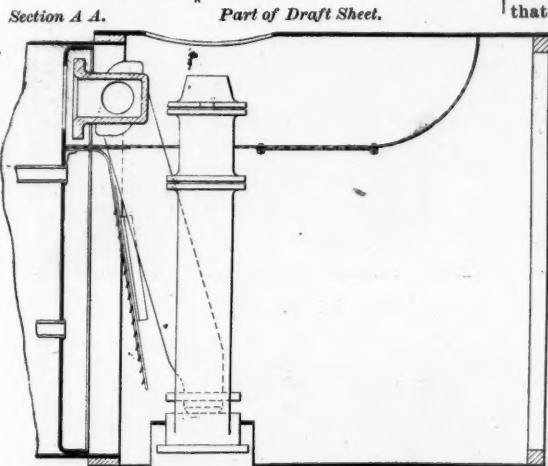
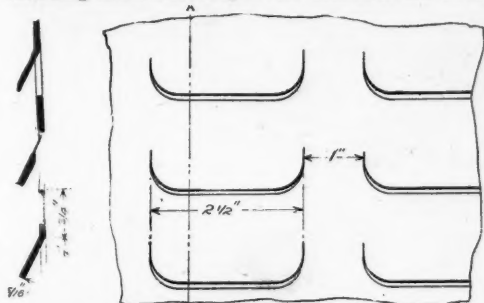
This device has been found to be of great advantage in improving the steaming qualities of the engines, permitting the use of 4¼ in. to 4½ in. nozzles in 16 in. x 24 in. and 4½ in. to 4¾ in. in 17 in. x 24 in. engines, thus largely increasing the fuel economy. Engines which formerly used one ton of coal in 32 to 35 miles, now run 45 to 60 miles to the ton, and the engineers and firemen are enthusiastic over the improvement, as it lessens their work very materially.

In a well designed and proportioned engine, where good draft and front end arrangements are considered, it is necessary to have a proper arrangement of diaphragm plate and ample proportion of netting. It is advocated that the area of opening in netting shall be about four times the area of tube opening. The netting is usually so arranged, but in looking at the usual draft plate and noting the line of motion taken by the gases and smoke in passing under this plate to the stack, and the shape and construction of the spark arrester, it is seen that but a small proportion of the netting area is of any advantage, it being usually less than 50 per cent. of what should be.

With the extension fronts as used on locomotives burning soft coal a spark arrester of wire cloth with meshes 3 in. x 3 in. or 3½ in. x 3½ in. is used; this netting is applied in various positions, usually extending from the front tube sheet horizontally from a line with the top row of tubes, forward to a point near the front door, where it is curved upward and fastened to the top of the smokebox sheet. In front of the tube sheet, beginning at

the top row of tubes, a deflecting plate or diaphragm is fastened, the top being situated from 3 in. to 8 in. from the tube sheet and extending downward at an angle of from 10 to 30 deg. to within 10 in. to 14 in. of the bottom of the smokebox. The exhaust draws the gases and sparks from the firebox through the tubes and out of the opening between the bottom of the deflecting plate and the bottom of the smokebox, the sparks being deflected to the front of the smokebox, the gases finding their escape through the netting to the stack. A casual observation of the angle which the gases and sparks take in passing this blank plate toward the stack will show that only a portion of the netting placed in the front is available for the direct passage, that portion being a line forward of the perpendicular from the bottom of deflector plate, and as this portion of the netting is obstructed by a manhole, the latter lapping on the edges from 1 in. to 2 in., obstructing from 72 to 144 sq. in. of area, the deflection of the gases and sparks forward against the front is in proportion to the curve of the netting upward, and the striking of the netting at an oblique angle again reduces the free passage of smoke and gases as well as putting the sparks in agitation, increasing the small particles of cinders which pass through the arrester to the annoyance of the passengers and increased danger of setting fires.

The blank deflecting plate is the usual manner for obtaining uniform draft upon the area of all the tubes



Roberts's Perforated Deflecting Plate.

and upon the fire on the grates. Were there no obstruction between the exhaust and the tube openings the draft would be concentrated upon those tubes most adjacent to the line of suction from the exhaust, and upon the fire where the suction through the tubes would act most directly. With the perforated plate as constructed, the perforations are made in such a manner as to form a hood over each opening, and upon this principle the improved results are obtained, for in each of these openings is an area of $1\frac{1}{2}$ sq. in., and in a draft plate for a 54-in. front there are 100 sq. in. of opening. The hoods being on the side next the tubesheet, the gases pass upward through the openings, striking the netting at a point near tubesheet and forward the entire area of netting, making the available area for the free passage of smoke and gases to the stack 50 per cent. greater than with the blank sheet, and making the openings for the gases equal to the requirements of a good steaming engine.

In addition, the functions of the blank draft plate are preserved, but still requiring a circuitous route for the draft through these openings, adding greatly to the uniformity of draft upon all the tubes and upon the fire. The sparks are drawn under the draft plate and deflected to the front, for the sparks cannot pass through the hooded openings; thus the draft plate can be lowered considerably, and the cleaning of the sparks from in front of tubes is much improved and the sparks are more directly deflected to the front without being agitated, making a much cleaner running engine.

By the use of the draft plate, with hooded openings, a nicely regulated draft is got uniform through all the tubes and upon the entire area of the grates with a much milder exhaust, allowing the gases to flow through the tubes slower; thus the sparks and carbon are more completely consumed in the furnace and in passage through the tubes, increasing the heating value of the fuel and allowing more time for the heat to be imparted to the water surrounding the tubes.

Probably the simplicity of the device will prejudice

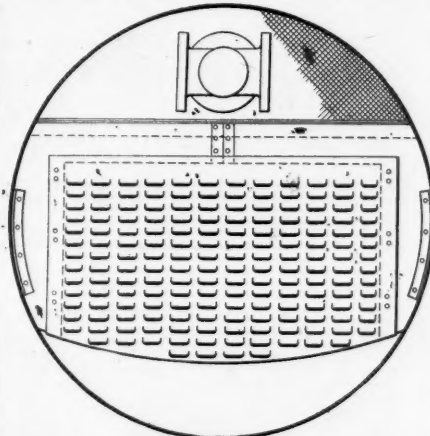
some as to the remarkable results obtained, but the fuel economy on the South Carolina Railway will exceed the records made by compound engines.

Impressions of the Worlds' Fair.

This is the greatest architectural display that the world has ever seen. Not the hill of the Acropolis of Athens, when covered with marble temples, nor the Roman forum in the days of Augustus, ever showed such an artistic grouping of columns, arches and long lines of façade. People, who, from indifference, do not come here while this fleeting pageant lasts, will regret it, for it will never be repeated in our generation. We cross the ocean to see Venice, but here is a greater Venice at our doors.

This is my first impression; the second is of wonder that the genius which could create such marvels should be so lacking in common sense as to carry the buildings up to the outer edge of the park, and leave no neutral zone to protect them in case of fire breaking out in the nests of wooden boxes which surround them on three sides. Given a heavy wind from the south, north or west and a fire breaking out just outside the line of the grounds, it would take a much better organized fire department than that which contended with the fire in the cold storage building the other day to save the whole exposition from being wiped out. Therefore, my advice is to everybody to come, see it before this possible catastrophe takes place.

The wonderful architectural display of the Columbian Exposition would not make it a success, unless the buildings were also well contrived and arranged in the display of exhibits. I have seen all the world's fairs, except the fine one in London and that at Vienna, and I am sure I am right in saying that these buildings, considered merely as for the display of exhibits, far surpass any of their predecessors. They are well and fully lighted, without that glare which in former expositions has been found to be so painful. Their great height and good ventilation makes them cooler in a hot, still day than any place out of doors. Tired and hot people appreciate this. The classification is admirable; by which I mean that it is easy to find anything you want, and to see it



For drawing long, heavy trains, with few stops, nothing yet devised can beat the steam locomotive. In rapid transit and suburban service, the greatest carrying capacity comes from small trains running very frequently and stopping very often. Other things being equal that line which gives its passengers seats will take the traffic away from that one which makes half of them stand up.

The locomotive train has to suffer a loss of energy due to stopping and starting over 80 tons every third of a mile, or $1\frac{1}{2}$ minutes apart. The light electric train can afford to stop and start its 40 tons every sixth of a mile, or once in 40 seconds, at no greater cost. The electric line costs a little more than the locomotive line for power and equipment, but this is more than made up by the low fixed charges on a lighter and less expensive structure. The dead weight per passenger of the locomotive train is about 400 lbs., that of the electric train about 175 lbs. Will not this difference tell in running expenses?

The whole question may be summed up as follows:

The use of the present style of cars and the economy of running as many cars in a train as the locomotive can start induce the managers of locomotive lines to run heavy trains at longer intervals apart, both for suburban and intramural traffic. Consequently we see wherever the surface electric trolley car, with its one-minute intervals and no time table, competes with a steam locomotive line, with trains even 20 minutes apart, it always draws away the traffic from it. The elevated electric line should not have more than four cars, nor intervals greater than one minute in the heart of a city, or five minutes in suburban traffic. Give people this service, and seats instead of standing room, and it will take all the traffic.

The Illinois Central Railroad runs eight-car express trains, seats 90 people each, on cross seats, with doors at the sides, from Van Buren street to the Fair grounds by locomotives. This is better than an electric service would be, because there are no stops. If, after the Fair is over, they would run four-car trains every five minutes on their suburban lines, either by electric motors or locomotives, they would build up a business in a few years equal to that of one of the Manhattan lines.

It has been often disputed whether it is better to use an electric locomotive or put motors on the cars. For city and suburban traffic we have said that frequent and light trains are the best, consequently it follows that if a motor on the car like that on the Intramural line can haul the light train satisfactorily, that is the cheapest; but where grades are heavy a second motor on another car, connected electrically and mechanically with the five, would be necessary. Locomotives for long trains and electric motors on cars for light trains is the best practice.

T. C. CLARKE.

July 24, 1893.

Track Elevation in Chicago.

The City Council and Mayor appear to be at variance on the question of elevating the tracks of the railroads within the city limits. The Council committee which has had the subject under consideration for four months announces that it has been unable to agree upon a system of elevation that could be enforced under the O'Neil ordinance passed last winter, and asks the Mayor to take efficient steps to coerce the railroads to at once begin the work of elevation. The latter official replies that inasmuch as the ordinance fails to prescribe any system of work or in any way specify how the act is to be enforced in case the railroads decline to do the work, the city officials are powerless to act. The Corporation Counsel sustains the Mayor and says that the proposition made by some of the members of the Council Committee to commence tearing up tracks would render the Mayor and corporation liable to suits for damages.

In most cases the railroads that have been asked to present plans for elevating tracks have merely appeared before the Council Committee and announced that any plan that could be suggested would be impracticable from many points, also that the cost would be greater than any railroad centering here is able to meet, and in view of these facts they declined to present propositions for elevations.

The Chicago, Rock Island & Pacific and Lake Shore lines that virtually use the same tracks for certain distances have through their engineers presented a number of propositions contemplating partial elevation and partial depression of tracks, but they were all rejected. The chief officers of those lines also state that they would not attempt the work under any of the systems presented by the engineers unless the city consented to not only stand the great bulk of expenses, but become liable to the owners of abutting property for damages that track elevation might entail. This the city will not do. In fact the Corporation Attorney states that the act would be illegal.

These separation fever has also broken out at Minneapolis. General Manager Earling of the Chicago, Milwaukee & St. Paul stated to-day that they had notice to commence the work of elevating and depressing their track in that city, and that the city authorities said it could be done for the modest sum of \$1,500,000. This, said Mr. Earling, means double that amount. When asked what his company would do he said nothing. They cannot enforce action because, aside from other considerations, public sentiment at Minneapolis opposes it. One of

when you do find it, unless its great popularity draws such a crowd that you cannot get near it. In these three most important respects the Chicago Exposition is far and away the best. There are so many buildings that the great divisions of Art Manufactures, Machinery, Mining, Fisheries, etc., can be easily kept separate. By visiting those on separate days the visitor does not have that confused feeling in his mind, which smaller expositions give him.

In each World's Fair there has been some exhibit which has played a great part in human affairs. At the English Exhibition it was the sewing machine; at the Philadelphia Exhibition it was the telephone, and unless I greatly mistake, at this Exhibition it is the electric elevated system called "Intramural." Rapid transit in cities and suburban towns is among the most important questions of the day, and any invention or plan which promises to assist in its solution is of vital importance.

Compare the Intramural Electric with the Southside Elevated, locomotive, system. The electric line runs trains of four cars, seating 384 persons, with no standing room. The train weighs, with motor on forward car, about 40 tons. On a line properly constructed for speed, and without the sharp curves, the same speed could be attained between stations as with locomotive service, although now it is less. The electric motor can accelerate its trains quicker than the locomotive, so that on similar tracks it would make better speed, including stops.

The Southside locomotive train consists of five cars. To compare with the electric line, we assume four, or we might have increased that of the electric train to five cars. These four-car trains seat 192 persons, and, by dint of cramming in standing passengers, could carry the same number as the electric, or 380. Train and engine weigh more than double the other, or about 88 tons. It averages 15 miles an hour, including three stops per mile. On an equally good track the electric trains could beat this, on account of quicker acceleration.

the leading newspapers there also ridicules the proposition as too absurd to be considered, and says that the tracks there will not be changed in twenty years or any other time. It therefore seems likely that the track elevation idea in that city will soon run its course and subside.

D. D. M.

CHICAGO, July 24.

Air-Brake Exhibits at the World's Fair.

The principal air-brake exhibits are grouped together near the north end of the Transportation Building, and there are others of lesser importance, shown mostly in models or sections of parts and generally of the vacuum type, located in other parts of the same building. The Westinghouse, New York, Boyden and Crane exhibits are the most elaborate, each company having expended much in energy and money to make its showing as complete and interesting as possible.

The Westinghouse Exhibit.—The general arrangement of the Westinghouse rack and other features shown will be seen from the engravings, figs. 1 and 2, reproduced from photographs. In general, the exhibit consists of 100 sets of freight car brake apparatus coupled together in the same manner as if erected on 100 34-ft. cars, and so arranged that either 50 or 100 may be operated together. The piping is $1\frac{1}{4}$ in. in diameter and the total length for the 100 cars is about 4,000 ft. On the same rack is the necessary compressed air train signaling apparatus for the equipment of 12 passenger cars and a locomotive.

The different parts of the air-brake and the signaling apparatus are shown with sections removed so that the construction and operation of each may be more readily explained. Just east of the brake rack is a suitable frame work on which is displayed a form of reinforced brake apparatus, which is intended to develop a maximum braking force of about 200 per cent. of the weight of the several vehicles when running at high speed; provision being made for the automatic reduction of pressure proportional to the reduction in speed of the train. It is expected that in the course of a few weeks the Pennsylvania Railroad will make a complete test of the reinforced brake.

A portion of the space allotted the Westinghouse company is occupied by the exhibit of the American Brake Company. The display consists of a portion of a locomotive frame suitable for a locomotive having six driving wheels. On this frame are attached the three styles of arrangement made by this company. There are also three models, to scale, of the three driver brake arrangements and of the engine truck brake. The wheels are revolved by means of an electric motor and the brakes operated as in the full size form.

The New York Air-Brake Company.—The engraving, fig. 3, shows the rack arrangement of this company. The piping and apparatus are the usual equipment for a 50-car train, including the locomotive. The cylinders and triples are arranged on the semi-circular rack, as shown, and the piping, bent in the shape of a kite, is arranged vertically overhead. There are 2,100 ft. of $1\frac{1}{4}$ -in. train pipe and about 200 ft. more of branch pipe. Under this rack is shown a train signal system with complete apparatus for an eight-car passenger train. In the open space, nearly inclosed by the rack, are two trucks and part of a freight car frame showing the method of arranging all the apparatus usually placed on such cars and also the device for applying greater braking force to cars having loads.

There is also displayed a reinforced brake designed by this company for application to passenger car trucks. The arrangement shown is that for a six-wheel truck. Two extra cylinders are required in this system of reinforced brake, on the heavy cars with six-wheel trucks, one for each truck, but on the ordinary passenger car with four-wheel trucks only one extra cylinder is used. The reinforcing cylinders are 8-in. in diameter, and the regular brake cylinder 14 in. The 8-in. cylinders are connected with a valve which has a pipe connection with the 14-in. cylinder and the train pipe. This valve is so constructed and connected on passenger equipment that when the pressure in the 14 in. cylinder exceeds the pressure in the train pipe air flows into the reinforcing cylinder, the piston rod of which is connected with a lever, and when the rod is pushed out the jaws attached to the lever grip the elongated piston rod of the piston in the regular cylinder, and so applying additional force to the brake lever. In freight service the valve is cut into action on loaded cars, and is so adjusted that when the pressure in the regular cylinder has reached 20 or 25 lbs., air is admitted to the reinforcing cylinder. The method of attaching the reinforcing brake to a six-wheel truck is also shown, and will be understood from the illustration fig. 4. The feature of it is the floating lever made with a disc in its centre. The brake rods from the beams on the outside pair of wheels and the middle pair have pin connections in the disc, so arranged as to equalize the pull on the two rods. The brake rod from the beam of the inside pair of wheels is connected with the lower end of the lever, thus equalizing the pull on all the rods.

There is also a complete quick-action automatic air-brake equipment for 10 passenger cars. The different parts of the apparatus, including cylinder, triple valve and duplex pump, are displayed; these have sections removed to show the action and construction of each, one of the interesting articles being an automatic drip for the air reservoirs. This is so designed that a pressure in the reservoir holds the valve closed against a light weight, the weight being sufficient to open the valve to drain the reservoir when the pressure is removed.

The vacuum brake manufactured by this company is shown as supplied to rolling stock of railroads and also with sections of the apparatus removed.

The Crane Company.—Although this company has

that the 100 may be operated together or only 50 may be thrown into action. It is also possible to operate the brakes on the right of the exhibit or those on the left starting at the pump end, or to operate both sides together, or down one side and up the other. The pumps shown are 8 in. in diameter and 13-in. stroke, and the engineer's valve is the same as that which, with other parts of this brake, was described and illustrated in the *Railroad Gazette* of June 23, 1893.

The exhibit is equipped with apparatus for taking the time of application and release and such other data as is usually taken in brake trials. Tests made since the apparatus was erected have given great satisfaction to those interested. An emergency application in 50 cyl.

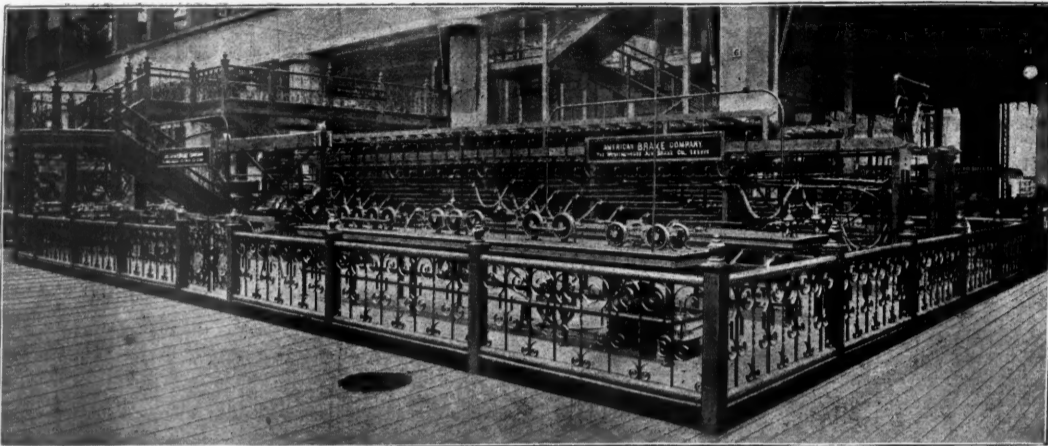


Fig. 2—Westinghouse Air-Brake Exhibit.



Fig. 1—Westinghouse Air-Brake Exhibit.

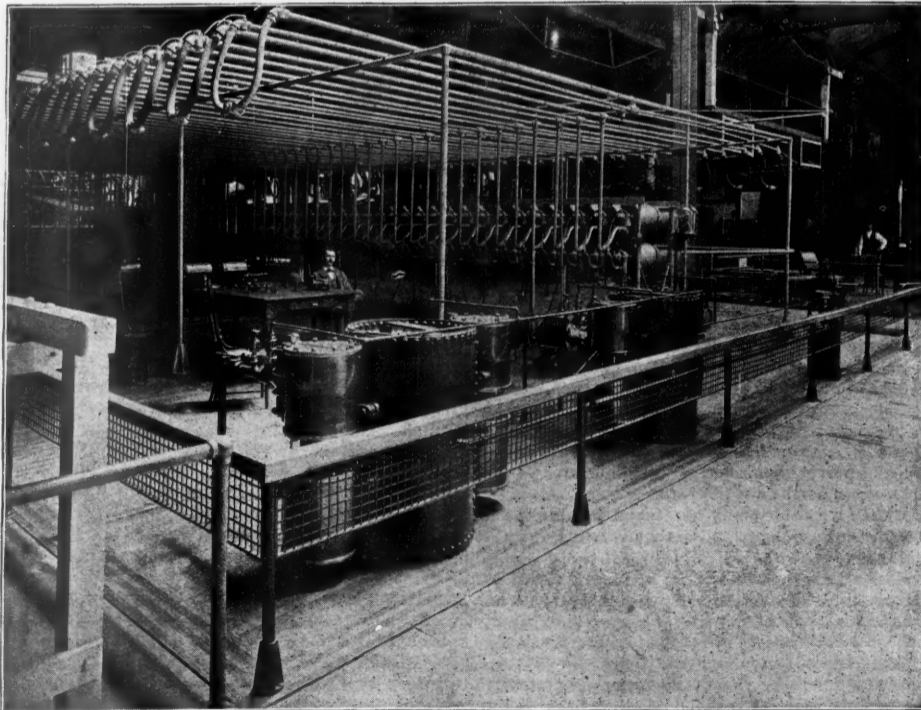


Fig. 6—Boyden Air-Brake Exhibit.

EXHIBITS OF AIR-BRAKE APPARATUS AT THE WORLD'S FAIR.

but recently placed upon the market a complete air-brake equipment, its exhibit is large and very complete, and indicates that it is well prepared to meet the requirements of the trade. The illustration, fig. 5, shows how the exhibit is arranged. Their apparatus is complete for 100 cars, each length of train pipe, however, being about 10 in. longer than that used on the M. C. B. rack. The pipe is bent in arches diagonally across the space and under it are the cylinders, arranged on either side of a central aisle, with the branch pipes extending down from the train pipes. The connections are such

induced is made in less than three seconds and has been made several times in $2\frac{3}{4}$ seconds. After a full service application with 70 lbs. pressure the piston in the fiftieth cylinder begins to move back in 14 seconds. With 100 cylinders the brakes are applied in less than six seconds. These records are within the requirements of the M. C. B. Association.

The apparatus was not specially prepared for exhibition; and considering also that the triples and other parts were from the first lot made by the company, it is to be complimented on the very successful operation.

The Boyden Brake Company.—As will be understood from the engraving, fig. 6, the piping in the Boyden display is straight, and is raised well above the floor, thus giving free access to all the apparatus. The crossover pipes lead from the train line down to the triples and brake cylinders; these latter are arranged on a suitable rack. The piping is full length for fifty 34-ft. cars. There are 100 cylinders and triples shown in the engraving, fifty of which are the Westinghouse and fifty of the Boyden. The piping and valves were so arranged that all of either kind could be operated together or any portion of the 50 if one design could be operated with enough of the other to make a total of 50, or a less number if de-

axle, and the piston-rod of the oscillating pump is connected with it. The pump has direct connection with the auxiliary reservoir, which in turn is connected through the controlling valve, with the main reservoir.

The air for applying the brakes is taken direct from the main reservoir, straight air system, the auxiliary reservoir retaining its pressure to govern the pump. The pump, having been thrown out of action by the governor when the maximum pressure was supplied in both reservoirs, does not begin action again till connection is made between the auxiliary and main reservoirs through the controlling valve. By this arrangement the pump does not restore the pressure in the main reser-

vate interest (as, for example, a railway company's electric signaling arrangements), it will practically fall to the latter to get over the difficulty by erecting complete metallic circuits instead of employing the earth as a return. The telephone company (in this instance), like a great many other monopolists, has tried to "get the earth"—and failed.

The next few years will see, without the least possible doubt, a very great and rapid increase of electric lines in Great Britain and Ireland—the latter being specially mentioned because the Dublin Southern District Tramway Co. (much to the distress of the Dublin, Wexford & Wexford Railway, whose lines run parallel for seven or

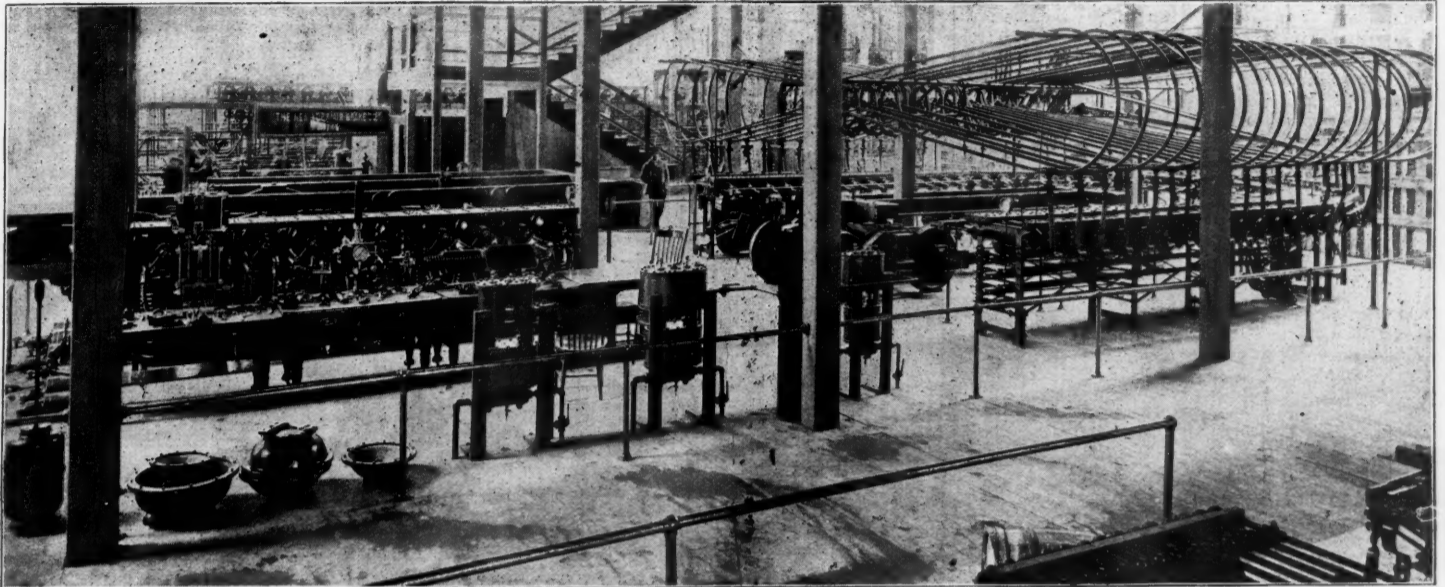


Fig. 3—New York Air-Brake Exhibit.

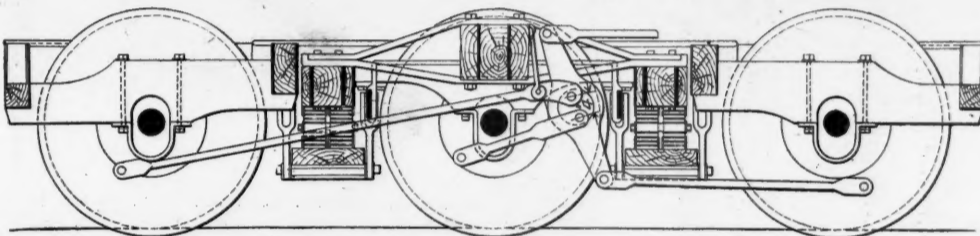


Fig. 4—New York Air-Brake Co.'s Method of Equalizing Brakes on 6-Wheel Truck.

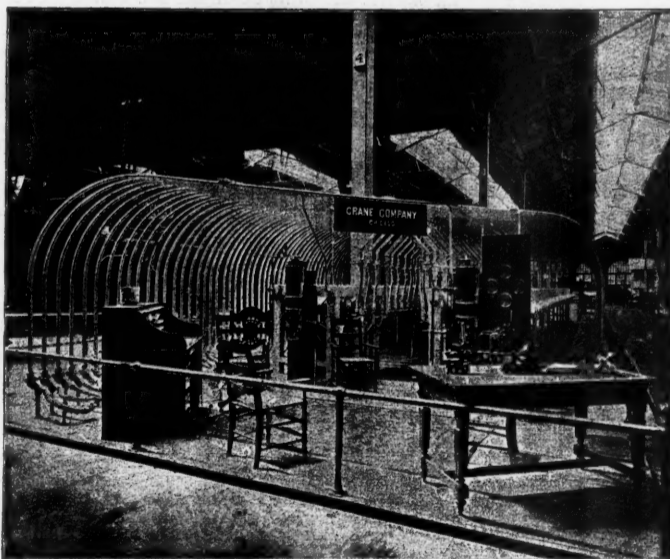


Fig. 5—Crane Company's Exhibit.

EXHIBITS OF AIR-BRAKE APPARATUS AT THE WORLD'S FAIR.

sired. This arrangement was made to show that the Boyden triples would operate satisfactorily with those of the Westinghouse company. Recently the Westinghouse triples have been removed.

The company has also attached an electrical recording apparatus, by means of which data may be taken, giving the time required for application and release.

At one side of the exhibit are two main reservoirs, pumps, engineer's valves and all apparatus for a complete air-brake equipment. The pumps are operated by means of compressed air supplied from Machinery Hall, and air for operating the brake is obtained from the same supply, or from the pumps when they are working.

The Genett Company.—Between the Boyden and the New York exhibits is a display of the Genett Air-Brake. The brake is designed for use on street cars, especially on electric and cable cars. An eccentric is placed on one

voir till the motorman places the controlling valve in the position to connect the two reservoirs; this he does after the train has been accelerated to speed, so that the motor does not have the additional load of recharging the reservoir while so much power is required to accelerate the train.

Some English Railroad Notes.

Whatever may be the opinions of railroad engineers as to the possibility—not to say advisability—of employing electric traction to any great extent as compared with the use of steam locomotion, there can be no doubt that for street tramways, suburban lines, and even the light railways which act as feeders to the trunk lines, the electric motor is the most suitable appliance at our disposal in the shape of a mechanical power. Its field in this respect is pretty much unlimited, and—making due allowance for varying capacity

—this remark applies as much to England as the United States.

At any rate, it is felt—rightly, too—that a momentous decision has been come to regarding developments in electric traction generally by the Joint Committee of the Houses of Parliament, which lately sat for the purpose of receiving evidence as to the prejudicial effect of electric lines upon telephones, telegraphs, etc. This Committee has just reported to Parliament, more specifically drawing up a model clause for insertion in all electric tramway and railway bills brought before the two Houses; and the clause thus settled upon is regarded by the electric traction interests as being wholly and entirely in their favor.

If any interference takes place between electric lines and the adjacent telephone or telegraph systems whether forming part of the public service or of a pri-

eight miles with the tramway), have just secured their powers to erect eight miles of double track electric road through a most populous district.

American passengers traveling to or from Europe by the Liverpool steamers, and taking the boat at Queens-town, will doubtless remember the short distance between Kingstown (where they land from or embark on the Holyhead steamers) and Dublin, over which they run upon this railway company's lines. The American mails are conveyed this way also.

Railroad men in general—and certainly those of the permanent way department—will doubtless remember the curious accident that happened last year on the Furness Railway, when without any warning a tremendous hole was formed under the eight or ten tracks (with sidings) of this busy line, at a place where a locomotive was standing, previous to coupling up to a train. The engine was completely swallowed up, sinking some 60 or 70 ft. into the old and disused coal workings that caused the subsidence.

A very similar accident occurred the other day at a small place in Scotland, called Clarkston, about 12 miles from Glasgow, on the main line to Edinburgh; though fortunately the results were not quite so serious. The Edinburgh express had only just passed when nearly the whole of the station platform subsided bodily into some old mineral workings underneath, the roof of which had given away.

The writer is advised, however, by Mr. Carswell, the Chief Engineer of the North British Railway, that the mishap was not so serious as the newspaper man has desired to represent it; at any rate, the consequences are unimportant. So far as that goes, one may of course see not a few railway bridges of brick work, otherwise in excellent condition, but which are, however, of necessity, swaddled in strong iron bands and supported by timbers, in order to keep them standing upright, when the colliery workings underneath cause a subsidence. The writer remembers noticing quite recently one such instance near Halesowen, in the Black Country, and in the coal or brine pumping districts the repair bill to railway companies must be very great, so far as the permanent structures are concerned.

Thanks to the courtesy of Mr. Wilson Worsdell, the Locomotive Superintendent of the North Eastern Railway, the writer was enabled a week or two ago to watch the performance of some of the new express engines on that line; though nothing very extraordinary happened for chronicling. It will be remembered that on this line was made what is looked upon as the English record—a speed of 87 miles per hour over a short distance on the level. Coming back from Edinburgh to Newcastle, on the footplate, the engineer was the same "canny Newcastle driver" who had made the record; and naturally enough he didn't think it could be easily beaten—no, not even on the N. Y. C. & H. R. It would be worth the money required for a trip across the Atlantic to see his face when mounted in the cab of "999," west of Albany.

Mr. Worsdell's latest type of express engine would in

some respects be considered by English engineers a step backward. It is compounded on the Worsdell-Von Borries principle, but has four coupled driving wheels, 7 ft. 6 in. diameter or 7 ft. 7 1/4 in., to be exact. As in his single driver-compound class, the valve chests project outward some distance from the smokebox, and are boxed in, thus giving a very solid appearance to the engine. The engines with coupled driving wheels run very steadily indeed, and apparently can make speeds equal to the single drivers, while of course they have a considerable pull over the latter in going up the grades between Edinburgh and Berwick.

F. B. L.

Staybolt Inspection and Specifications.

The report of the proceedings of the Southern & Southwestern Railway Club for April contains a report and discussion on the subject of "Staybolt Inspection and Practice." It gives the practice of different railroads and a supplementary report of the investigations and conclusions of the committee as to the best form and material for staybolts.

In answer to inquiries about "Staybolt Inspections," the committee received replies from 22 railroads. The following table shows the number of roads (and loco-

record by locomotives go the practice of holding up and not holding up while test is being made seems to be about evenly divided. The correspondence of the committee disclosed the fact that the majority of the roads as well as the majority of locomotives represented, kept no accurate or careful diagram or record of broken stays, so that reliable information as to the location of breaks could not be obtained, that of the 14 roads using pressure in the boilers while testing, representing 8,178 locomotives, the prescribed pressure varied all the way from 25 to 200 lbs. It was also observed that holding up was generally done where boilers were tested without pressure, or with low pressure. Two roads, representing 1,199 engines, test with hot water pressure, both of them holding up.

As to tests of bolts by the sound the experience of the committee was, that every row of staybolts has its own particular sound, and this sound varies with the location of the staybolts in the rows, and it takes considerable practice to distinguish the sound of cracked or broken stays from that of good stays.

The committee also found that it was unquestionably true that more broken stays could be found by sounding under a pressure of 50 or 60 lbs., either of steam or air, and no water in the boiler to deaden the sound, than in any other way, and that there was no advantage in holding up on the outside when pressure was used.

As regards the portions of the firebox in the various patterns of boilers in which most broken staybolts are found, the following information was gleaned:

In a long firebox, either of the radial stay or Bel-

and tensile strains, and as to the best form to be used:

Assuming that the boiler pressure is 160 lbs. to the square inch, and that the stays are spaced 4 in. apart, the total tensile strain on a stay would be 2,560 lbs. This on a diameter at the base of the thread equal to .775 in., equal to .472 sq. in. in area, represents a tensile strain of 5,420 lbs. to the square inch. As ordinary quality of staybolt iron has a breaking strength of 50,000 lbs. to the square inch, it is very evident that with a factor of safety of one to ten the tensile strain caused by the boiler pressure is not what causes the stays to break. The expansion of a long boiler carrying 155 lbs. of steam due to the temperature, is known to be a fraction under 3/4 in. by actual measurement from the back of the smokebox to the back boiler head. While the cylindrical portion of such a boiler is slightly longer than the firebox portion, still the firebox portion is exposed to the greatest amount of heat, and especially so if the sheets are covered with scale on the water side, it is plain that the natural expansion, if unhindered, of the side sheets of a firebox 10 ft. long, would be fully 1 1/4 in. It is also reasonable to assume that under the conditions which exist when an engine is being fired up hurriedly, having a hot fire on the grates, and cool or cold water in the boiler, with the scale on the water side of the firebox sheets, the expansion referred to above will take place in the inner firebox before the outer shell of the boiler has become warmed up sufficiently to have expanded at all. If the boiler is so constructed that the inside firebox can move without causing its own destruction, or heavy straining of the flues or rivet



Fig. 1.

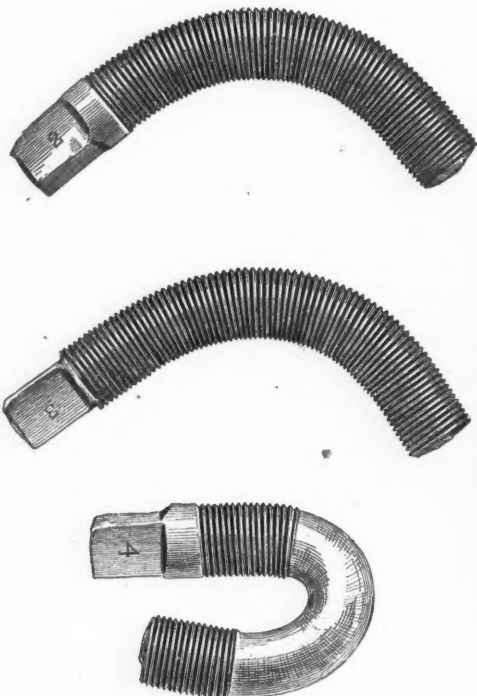


Fig. 2.

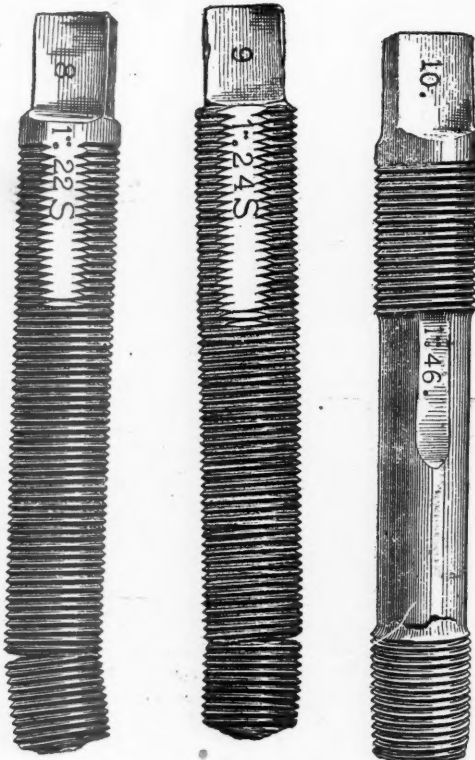


Fig. 4.



Fig. 3.

Illustrations with Report on Staybolt Inspection.

motives represented) and their replies to the three following questions: (1) At what interval are tests of staybolts made? (2) Are tests made by sounding only, or by holding up from the outside? (3) Is pressure used while testing and with or without water in the boiler?

INTERVAL BETWEEN STAYBOLT TESTS.

	Under 10 days.	11 to 14 days.	14 to 30 days.	30 days.	60 days.	90 days.	Yearly.	Totals.
Roads.....	3	3	7	3	4	1	1	22
Locos.....	3,106	1,765	1,010	1,291	1,618	260	236	12,416

	Test with pressure.	Test without pressure.	Test with holding up.	Test without holding up.	Keep diagram.	Do not keep diagram.	Totals.
Roads.....	14	8	13	9	8	14	22
Locos.....	8,178	4,268	6,301	6,145	5,892	6,554	12,446

A study of the table will show that the majority of locomotives are tested more frequently than once per month, and of these one-half are tested every fortnight. It will also be noticed that, roughly speaking, twice as many engines and twice as many roads test with pressure in the boiler as without, and as far as the

paire pattern, where there is no sharp bend or O. G. in the sides, the most broken stays are usually found in the first two or three side rows at the front and back ends of the firebox. Generally the majority of them are in the front, and on the right-hand side, where the right-hand injector is most used. Where there is a sharp O. G. in the sides of the firebox, whether long or short, the most broken stays are found in these sharp bends, equally distributed along the entire length of the firebox. With crown bar fireboxes, especially where short and deep, there seems to be no well defined place where the staybolts most frequently break, but one feature is to be observed in the breaking of staybolts with these boxes, which is not usually found in the long radial stay or Belpaire boilers, that is, a large number of broken stays are found around the back heads, especially around the fire door. A little careful consideration of the reasons for the breaking of stays will show that as the boiler pressure is a very inconsiderable item in the strain on a staybolt, they must be broken by the constant bending backward and forward, due to the movement of the inside firebox in the boiler. With the long fireboxes, supported by Belpaire or radial stays, the maximum movement is longitudinal; when with the crown bar short deep fireboxes, the maximum movement is vertical. With the radial stay boilers, and crownbar boilers, having a sharp O. G. at the sides, the maximum movement is at this O. G., as this is the weakest point of the boiler, and gives way to the crushing strains due to expansion. It is therefore natural to look for broken stays at these points.

The following was offered as a supplemental report on the strength of staybolts to resist the bending

heads, no particular harm will occur. If this is not the case, something must give way. The committee presents (fig. 1) for the examination of the club some samples of firebox steel, which were originally the very best grade of Otis firebox steel, which clearly show how the crushing and stretching of the side sheets of the firebox, due to its expansion and contraction, have torn and cracked the metal between the rows of staybolts. It is therefore plain that this expansion and contraction do exist in ordinary service. It is noticeable that at the lower portions of the firebox, where the inner sheets are rigidly held by the mud ring and by the outer firebox, the firebox sheets give way, but the stays do not, although the heat action is greatest at the fire. At the upper and bent portions of the box, where it has a chance to expand, the sheets never give way, but the staybolts break instead.

Experiments made in England with fireboxes that were slightly corrugated, and therefore more easily compressed than a straight flat sheet would be, have shown that to shorten the length of a corrugated firebox, 2 ft. 6 in. in diameter by the small amount of 1-32 in., required a pressure of over 300 tons. Carefully made experiments have also shown that with clean sheets a difference in temperature between the fire side and the water side of a firebox can exist in the metal when 7-16 in. thick of 88 deg. How much the difference in temperature would be when there is 1-16 in. of scale on the water side would be hard to conjecture. Bearing these facts in mind, it must be very plain to thinking men that the provision for the expansion and contraction of locomotive fireboxes in the boiler shells is of the most vital importance, and is generally neglected, or, if receiving consideration at all, is looked upon in the light of something to be overcome by excessive rigidity, extra stays, braces and so on. It must also be remembered that steel loses its strength and ductility very rapidly at temperatures over 500 deg., so that it is in no condition to stand severe strains. Your committee thinks that it would be wise in the motive power officers, in designing new locomotive boilers, to bear these facts in mind, and to so design their fireboxes and boilers that the expansion can take place without throwing excessive or concentrated strains on any portion of the boiler.

To get a clear idea of what the power of resistance to the bending of staybolts really is, some tests were made, the results of which are submitted herewith:

First, staybolt iron bought under specifications requiring a strength of 50,000 lbs. to the square inch, with a minimum elongation of 30 per cent. in 2 in., was tested in the tension machine to see if it was up to specifications. The test showed that the iron was above the specifications, standing 51,751 lbs. to the square inch, with an elongation of 42 per cent. in 2 in., and a reduction in area of 41 per cent., the elastic limit being about 30,000 lbs.

Three pieces of this iron, 1 in. in diameter, were taken, one threaded with a sharp "V" thread; the second threaded with dies having a flat top and bottom; and the third one had the centre turned down so as to entirely remove the thread.

These were bent until cracking showed itself (fig. 2). The two pieces threaded with a sharp and dull thread bent approximately to an angle of 90 deg. over a radius of 2 1/4 in. before cracking commenced, but the piece turned down at the centre was doubled almost to an angle of 180 deg. without cracking. Three sim-

lar samples were prepared of $\frac{7}{8}$ -in. iron of the same quality. In this case the stay threaded with the sharp thread would not bend so far as the stay threaded with the dull thread, which bent to an angle of 150 deg. over a radius of $2\frac{1}{2}$ in., while the turned-down stay did not crack when bent double close (fig. 3). Special attention is called to the fact that the $\frac{7}{8}$ -in. stay bends to a greater angle than the 1-in. stay.

Similar samples were then prepared of the above $\frac{7}{8}$ -in. and 1-in. stays. One end of each was secured in a steel nut in the shaping machine, and the other end vibrated to the amount of 1 in. The 1-in. stay with the dull threads cracked on both sides on the twenty-second stroke (fig. 4). The 1-in. stay with the sharp "V" thread broke in about the same way on twenty-fourth stroke; the difference between the two being so little that it is doubtful that there is any material difference in the strength. The 1-in. stay having the centre portion turned down, stood forty-six 1-in. strokes before cracking showed itself. The same series of experiments with $\frac{7}{8}$ -in. stays, prepared in precisely the same manner, showed that the sharp "V" thread at the base stood one hundred and sixteen 1-in. strokes, while that with the dull thread stood one hundred and ninety-six 1-in. strokes before cracking to the same degree. A stay $\frac{7}{8}$ in. in diameter, with the centre portion of the thread removed, broke with about the same number of strokes as the one with the dull thread, but it broke at the root of the last thread which was removed. In watching these tests it was noticeable that the iron first bent over its entire length between the supports, but, as the test progresses, the iron stiffened in the upper portion, and the bending was finally concentrated at the first thread above the nut.

In endeavoring to obtain a strictly speaking sharp "V" thread, the committee found that with ordinary chasing tools it was easy enough to get the top of the thread sharp, but that the case of the thread was almost invariably flattened off, and that as far as the power to resist bending is concerned, there is practically little or no difference between the so-called sharp "V" thread and the dull threads of the proper section of the United States standard of 12 threads per inch. Three samples of $\frac{7}{8}$ iron were then tested in the same way with the centre portion turned down, with similar results.

The committee expressed the belief that flexibility in the stays of the firebox, especially at these points where the maximum movement takes place, is of the utmost importance, and as the margin of safety over the tensile strength is very ample, even after the centre of the stay has been reduced below $\frac{3}{4}$ in., and as this reduction can be very cheaply and rapidly done in a turret lathe, or a special machine, we believe that $\frac{7}{8}$ -in. stays should be reduced in diameter to, say, 1-16 in. less than the diameter at the root of the thread, thus allowing the bolt to spring and bend over the entire length of the turned portion instead of the bending being concentrated at the root of the last thread next the inside of the outer sheet of the boiler.

The committee also recommended that when the stays are renewed and the holes tapped out to larger diameters, the new stays put in should be turned down at the centre portion so as to make them as flexible as the rest of the stays originally put in the boiler, which are adjacent to them, for two reasons: First, because the heavier stays are stiffer and will break a great deal more easily with fewer vibrations than a smaller stay, in spite of the fact that there is more metal in them; and second, because all the stays should be equally strained and be equally flexible.

To make the test complete, the committee also obtained samples of staybolts of the same quality as those mentioned above, which were drilled with 3-16-in. holes in the usual way to a depth of $1\frac{1}{4}$ in., and found that the drilling undoubtedly weakened the power of resistance of the bolt against bending. A $\frac{7}{8}$ -in. stay drilled with a 3-16-in. hole, to a depth of $1\frac{1}{4}$ in., broke with 12,780 $\frac{1}{4}$ -in. vibrations.

The committee also obtained samples of hollow staybolt iron, which stood a tensile strain of 49,000 lbs., with 45 per cent. elongation and 52 per cent. reduction of area. The $\frac{7}{8}$ -in. stay made of this iron having a 3-16-in. hole rolled throughout its entire length, broke at 63,720 $\frac{1}{4}$ -in. strokes, but when the centre was turned down to a diameter of $\frac{3}{4}$ in. this hollow staybolt made of the same iron, stood 93,600 $\frac{1}{4}$ -in. strokes before breaking. A very remarkable performance.

The committee expressed the belief that the superiority of the hollow staybolt over the drilled stay is due to the fact that the hole runs the entire length through, and the flexibility is equal the entire length, whereas drilling a hole at the outer end of the stay, say, 1 in. or $1\frac{1}{4}$ in. deep, weakens the stay at a point where it has a tendency to break anyhow, leaving the upper portion of the material, where it is desired that it should be flexible.

Reports received showed that some of the Canadian roads are using Whitworth threads for staybolts with round top and bottom to the thread. Some of the roads stated that they were using the United States standard form of thread for 12 threads per inch, which has a flat top and bottom, but the majority of the parties responding either did not know the difference or else had no uniform practice. It is believed, however, that most of the roads now use as sharp a "V" thread as they can get.

The committee thought that the life of the stays will be increased, and that there will be less risk of cracks starting in the sheets from the roots of the threads where they pass out of the sheets, if all the stays are made 12 threads per inch, in accordance with the United States standard section of thread for this number of threads per inch.

Quite a large number of roads are reported as using hollow stays or drilled stays; many more than your committee thought was the case before the information was collected. Experiments have shown that there is risk of cracking the sheets of the firebox with the hollow stay in some cases, it being found that small cracks would start in the sheets at the hollow stays, where no cracks would show in the alternate stays which were solid. It is stated, and it is reasonable for this to be the case, that the jet of air coming in through the stay, and causing intense and concentrated combustion, like a blowpipe, is the cause of this cracking, owing to local heating at these points. The committee believes that hollow staybolt iron should be used; that the thread should be of the United States standard section of 12 threads per inch; that the inner end of the holes should not be opened after the stays are headed up, but that the outer end of the holes should be kept open; that $\frac{7}{8}$ -in. stays should be turned down between sheets to scant $\frac{3}{4}$ in., and that this size should be preserved in making renewals; and that the lagging and jackets should be so arranged that the ends of the stays can be readily examined and in-

spected at as frequent intervals as the type of boiler and the water used may render advisable.

Seeing is believing, and the committee strongly advised that an inspection, which can be made at any time with steam up, by any inexperienced person, which is as definite and positive as is the case where hollow or drilled stays are used, is to be preferred to the uncertain methods of sounding now in use, which must be unreliable, even when made by skillful men under the most favorable conditions.

The committee consisted of Messrs. R. P. C. Sander-son, Chairman; F. H. McGee, W. H. Owens.

[TO BE CONCLUDED.]

Electric Heating.

Several of the electric heating companies have recently consolidated under the name of the American Electric Heating Corporation of Boston. This company claims to have bought up all the most valuable patents on heating apparatus by means of electricity in all its applications, from a heater to heat a lady's curling iron or a man's shaving mug to a car heater or a furnace. From this general corporation three sub-companies have been



American Electric Car Heater.—Style "A."

organized and they control all patents in their respective territories. They are the Western Electric Heating Co. of Chicago, controlling the Western States to the Rocky Mountains; the New England Electric Heating Co., controlling the New England States, and the Central Electric Heating Co., New York, controlling the Central and Middle States.

This latter company has just issued its first catalogue on car heating, which sets forth as the advantages of electric heating that the system is clean (no dirt, ashes, smoke or odor), that it occupies no valuable space, being very small and of such shape as to be put out of the way, that it is safe and durable, that it is efficient, and finally that it is economical.

One has but to see the heater at work to be satisfied of all those advantages except the last. It is certainly clean, compact, safe and durable. Its construction is extremely simple, consisting of a few coils of german silver around an iron and porcelain core, which is inclosed in an open cast iron frame. The wire is exposed to air and will carry with perfect safety six times the amount of current it is intended for. All parts are interchangeable and the heater is practically indestructible. As to its efficiency one can judge pretty well by sitting beside one of the heaters, but the company has better proofs of that in testimonials from many electric railroads using the heaters, some of which are published in the new catalogue.

The question then remains as to its economy. On this subject we would refer our readers to a paper on Electric Heating read before the Electric Club of Chicago by S. B. Jenkins. Mr. Jenkins quotes a statement from Tyndall that the best range gives a useful effect of only 6% of the

It is reported that one of the foremost roads in the country is experimenting with a view to applying electric heating to its cars, and this may be expected, for there has been great improvement in electric heating apparatus and it has gained a certain mechanical standing from the excellent results obtained in electric cars. There is little doubt but that it will find great favor on electric roads where electricity is at hand.

We give an illustration of the American Electric car heater and one showing the installation in an electric street car.

The heater is 2 in. wide by $10\frac{1}{2}$ in. h. i. h., and 26 in. long. Other patterns are made, one that may be fastened under the floor or to the side of the car. The heat is turned on or off by a switch, and requires no regulating.

Standard Live Loads for Railroad Bridges.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In accordance with a promise made a short time ago in one of my communications on the subject of "Standard Live Loads for Railroad Bridges,"

I herewith present to the engineering profession the results of the calculations made in computing the equivalent uniform loads for the proposed "Compromise Standard," together with certain deductions obtained therefrom by means of some auxiliary computations.

All of the calculations referred to were made by my assistant, Mr. Ira G. Hedrick, and were checked by other computers. The computations for determining the curves of the equivalent uniform loads received an additional check by the plotting, because said curves are so regular that an error as

small as five pounds per lineal foot could be readily detected by the eye, and in fact several small errors were thus found before the check by independent figuring was made.

These curves, and those for total end shears on plate girder spans, are to be soon published for distribution and I hope that you will see fit to reproduce them in full size in your paper.

On account of an editorial statement in the *Engineering Record* to the effect that a constant carload per lineal foot combined with a single concentrated load, properly determined, will produce stresses agreeing as closely with those found by the so-called "exact method" of wheel concentrations as do stresses found by the equivalent uniform load method, Mr. Hedrick, at my suggestion, continued his calculations so as to settle conclusively the correctness or incorrectness of this claim. Because of our having on hand the calculations for the equivalent uniform loads, we were well equipped for making the necessary investigations without the expenditure of an undue amount of labor. In dealing with the single and double concentrated load methods, we have endeavored to be perfectly fair; and have done our best, in determining the values of the concentrations, to obtain results agreeing as closely as possible with the theoretically correct ones. Should any one think that he can make a better showing for the single or double concentrated load method than we have done, the results of our calculations of stresses by wheel concentrations will be placed at his disposal; and he can rely on their correctness, for they have been most thoroughly checked. However, I shall make some deductions presently which will nullify the effect of any unfavorable determination

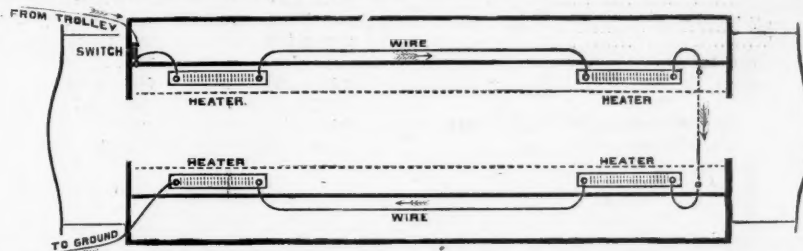


Diagram Showing Wiring of Car Where Four Heaters Are Used, Heaters Connected in Circuit in Series.

coal consumed, and then makes a comparison with the heating effect of electricity and makes a table comparing the two in favor of electricity for heating purposes. He concludes that electricity at \$60 per H. P. per year of 4,000 hours (11 hours per day) is equivalent to the heating effect of coal at \$8 per ton, and that the coal must be best quality hard coal, burned with care and discretion. He gives a number of experiments and tests upon which he has based his conclusions.

The idea that electricity can be generated by steam power and then reconverted into heat with economy for heating purposes has long since been exploded. It may be employed to accomplish certain results, such as broiling meats, etc., but not for general heating. The advantages of electricity over steam or hot water are hardly, it is believed, on the lines of economy, but upon those of cleanliness and space, and upon these it seems to have a decided advantage.

A strong point of the heater is that its effect may be directed where it is needed and most effective. This must also be conceded to the application of hot water and steam to car heating.

of the values of the concentrations, and eliminate entirely what may be termed the "personal equation" in our computations.

Our curves were prepared as follows: For truss spans the shear and moment for every panel of the 100-ft., 150-ft., 200-ft., 250-ft., 300-ft., 400-ft. and 500-ft. spans were computed by the concentrated wheel load method for both classes "Z" and "U" (the extremes), and the equivalent uniform loads were determined therefrom for each diagonal and chord section, after which the average of these for each span was taken for plotting the curves, except in the case of the 100 ft. spans where the equivalent uniform loads were made a little greater than the average. After plotting the curves for classes "Z" and "U," those for the intermediate classes were interpolated very accurately by determining the end shears. It was found, as was anticipated, that a direct average interpolation gave correct results.

Next the curves for equivalent uniform loads and total end shears for plate girder spans of all classes were computed by the exact method and plotted.

We next took up the consideration of the single con-

TABLE II.

TABLE SHOWING PERCENTAGES OF ERROR IN MOMENTS AT CENTRES OF PLATE GIRDER SPANS FOUND BY EQUIVALENT UNIFORM, SINGLE EXCESS AND DOUBLE EXCESS SYSTEMS.

Span, ft.	Class Z.			Class U.		
	Equiv. u. sys.	Sin. ex. system.	Doub. ex. system.	Equiv. u. sys.	Sin. ex. system.	Doub. ex. system.
15'	None	14.0 safety	14.0 safety	None	19.9 safety	19.9 safety
20'	"	7.8 "	7.8 "	"	11.3 "	11.3 "
25'	"	4.2 "	4.2 "	"	5.3 "	5.3 "
30'	"	2.1 "	2.1 "	"	1.9 "	1.9 "
35'	"	0.7 "	0.7 "	"	1.3 danger	1.3 danger
40'	"	0.5 "	0.5 "	"	2.3 "	2.3 "
45'	"	0.3 "	0.3 "	"	2.8 "	2.8 "
50'	"	0.0 "	0.0 "	"	3.2 "	3.2 "
55'	"	0.1 danger	0.1 danger	"	2.7 "	2.7 "
60'	"	0.1 safety	0.1 safety	"	2.2 "	2.2 "
70'	"	0.0 "	0.0 "	"	1.9 "	1.9 "
80'	"	0.1 danger	0.1 danger	"	1.7 "	1.7 "
100'	"	0.9 "	0.9 "	"	1.2 "	1.2 "

TABLE III.

TABLE SHOWING PERCENTAGES OF ERROR IN END SHEARS FOUND BY EQUIVALENT UNIFORM, SINGLE EXCESS, AND DOUBLE EXCESS SYSTEMS.

Span, ft.	Class Z.			Class U.		
	Equiv. u. sys.	Sin. ex. system.	Doub. ex. system.	Equiv. u. sys.	Sin. ex. system.	Doub. ex. system.
15'	None	1.9 safety	22.5 danger	None	45.4 safety	3.0
20'	"	6.0 "	16.7 "	"	33.3 "	10.0
25'	"	7.6 "	13.2 "	"	22.8 "	12.3
30'	"	5.8 "	12.8 "	"	18.1 "	13.3
35'	"	2.8 "	13.9 "	"	11.3 "	14.3
40'	"	1.7 "	13.8 "	"	12.0 "	14.4
45'	"	0.7 "	13.5 "	"	10.5 "	14.1
50'	"	0.6 "	12.5 "	"	9.5 "	13.5
55'	"	0.5 "	7.8 "	"	7.9 "	8.4
60'	"	1.5 danger	6.8 "	"	4.0 "	7.6
70'	"	3.2 "	6.6 "	"	0.7 "	7.9
80'	"	4.3 "	6.4 "	"	1.5 danger	8.0
100'	"	5.1 "	6.4 "	"	2.7 "	7.9

TABLE IV.

TABLE SHOWING VARIATIONS IN PERCENTAGES OF ERROR, AS GIVEN BY EQUIVALENT UNIFORM, SINGLE EXCESS AND DOUBLE EXCESS SYSTEMS.

Span length.	Members.	Class Z.			Class U.		
		Eqv. u. sys.	Sin. ex. sys.	Doub. ex. sys.	Eqv. u. sys.	Sin. ex. sys.	Doub. ex. sys.
100 ft.	Chord members	4.6	5.0	7.6	6.7	7.5	0.4
	Web	7.0	15.6	7.6	6.3	18.5	6.5
150 ft.	Chord	0.2	0.2	1.4	2.0	2.2	0.2
	Web	4.8	12.7	9.1	2.5	14.4	7.7
200 ft.	Chord	0.3	0.3	1.1	1.5	1.6	0.4
	Web	1.9	8.9	7.0	2.6	9.7	5.8
250 ft.	Chord	0.3	0.3	0.9	1.3	1.4	0.3
	Web	0.6	6.9	5.8	2.8	7.2	4.6
300 ft.	Chord	0.8	0.8	0.5	1.1	1.1	0.5
	Web	0.6	5.5	5.0	3.5	5.6	3.8
400 ft.	Chord	0.5	0.5	0.3	0.7	0.7	0.3
	Web	1.0	3.8	3.8	3.9	3.9	2.9

logical sense. We fear, therefore, that the effects of the 'personal equation' have not been entirely 'nullified.'

"Percentages of variation of the results for the pin spans for the different systems of computation, even with the values taken by Mr. Waddell, do not differ essentially from each other except in the matter of the counters and one or two adjacent small web members, and such differences are of no practical importance. Hence the 'conclusions' regarding the uniform load with one or two concentrations are not proved; indeed they are without any real foundation whatever. It has been most conclusively shown that the so-called 'equivalent loads' will give results near enough to the ideal for all practical purposes, but that is all. This we have never denied; it was evident without so much figuring. We have never made as a 'claim' the observation that the single system with uniform loads would give as accurate results as the equivalent uniform loads, although we believe there is practically no difference, and nothing has yet been shown to the contrary. On the other hand, we have distinctly claimed that any possible difference between the two systems in this respect is of no consequence, and we still make that claim.

"Again, we have frequently observed that any proper system of computation should provide for the locomotives running at any point in a train, and Mr. Waddell has said that his 'equivalents' provide for that condition of loading. From the explanation of his tables it does not clearly appear that this has been done. We notice that Mr. Waddell again falls into the error of stating that the labor of computation of the single concentration method is twice that required by the method of uniform loads. It scarcely seems necessary for us to repeat our denial of that statement, but the evident error lies in the fact that the labor required by a single load computation is to that required by a uniform load approximately as unity is to the number of panels in the span contemplated.

"Finally, the wholesale interpolations between the classes 'z' and 'u' do not seem to us to be the best way of getting close values for such a wide range of computations, although we do not suppose the resulting errors are very great."

Davis' Shade Roller.

We illustrate herewith an improved car shade holder invented and patented by the Davis Car Shade Co., of Portland, Me. It consists of steel tube 4, having an oblong cross section, which is flattened by corrugations C at

both ends, so as to hold securely the wheel-bearing plate H. This plate H carries a rubber wheel with a brass bushing in the centre on a steel bearing M, and this whole box is inserted in the bottom of the car shade, so that the wheel travels up and down with the shade in a groove on the inside window-stop. The shade being fastened to a spring roller at the top goes up whenever it is released and the little rubber wheels at the lower corners act as guides to keep it square. The wheel acts also as a stop. It may be held by a brake G attached to a steel rod R, which brake is kept applied by a spring S.

To raise the shade one turns the thumb piece K, which turns the cam B, draws the rod R, compresses the spring S, and relieves the pressure of brake G against the wheel. When the brake is off, the wheel no longer acts as a stop, but lets the shade go up, and then acts as a guide.

The advantages of such a curtain fixture are numerous. The rubber wheels do not rub, scratch or deface the varnished window-stop, and being always held firmly against the jambs of the window prevent tipping or uneven rolling. The shade may be adjusted at any height, and when pulled down tight, there is no projection below the box to scratch or deface the window sill. When the brake is released it does not retract the

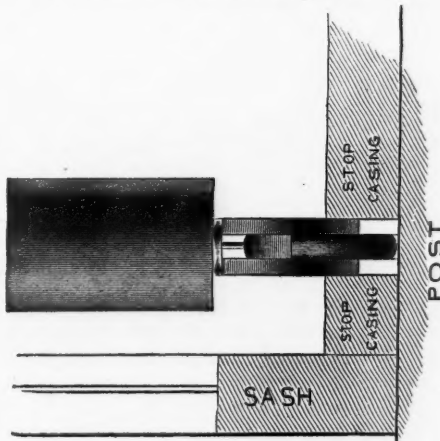


Fig. 2.

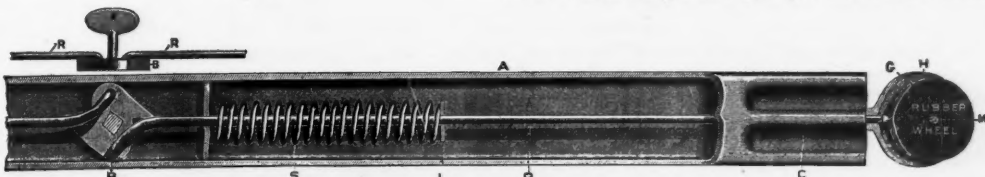


Fig. 1.—Davis' Car Window Shade Roller.

wheels from the sides of the windows, but they are always in contact with the window jamb and keep the edges of the shade from rubbing or running off the roller and wearing out.

Fig. 2 shows a section of a corner of a car window with the end of the shade-holding device.

Rubble Concrete Masonry.

A long article appears in *Engineering* of June 23, 1893, on "The Use of Concrete in Railway Structures." The writer describes its use as a substitute for brick and stone in the form of what is termed rubble concrete in districts where good building stone and clay are not to be had.

This rubble concrete consists of large stones embedded in a matrix of Portland cement and crushed stone. The proportion of parts recommended after considerable experience and experimentation are one part cement to five parts of ballast. The ballast consists of clean broken stones or slag and coarse grained sand, and is required to pass a screen with 2-in. mesh. The materials are mixed dry and the proper quantity of water added through a rose or perforated nozzle.

The rubble concrete is laid in the following manner: A 6-in. layer of concrete is first put in, on which rubble stones are laid, care being taken that no two stones be nearer to one another, nor to any exposed surface, than 3 in. The stones are firmly bedded and rammed and probed all around with a trowel to insure against any vacant spaces. The stones are placed irregularly, but so far as possible with their diagonals perpendicular to exposed surfaces. The spaces between these stones are filled with the matrix before described, and then a layer is placed and leveled off to a height of 6 in. above the tops of the stones. Upon this level surface a second layer of rubble is laid in the same manner as the first, and so the pier or abutment is constructed of alternate courses of stone and concrete.

The faces of the work are formed by building a box frame of the shape of the pier or wall and lining it with smooth dressed boards, against which the concrete is packed and worked with a trowel. The corners are chamfered by filling in the corners of the box with filling pieces of wood. When the frame is removed the face of the work is smooth and requires no dressing or

pointing. Such masonry has been largely used abroad for abutments, wing walls, piers and even for arches. Some piers are mentioned from 40 to 80 ft. in height, with a cross section 12 x 45 ft. and a batter of 1 to 30. The following table is interesting, for it affords a comparison of the relative cost of rubble concrete and ordinary masonry. It is from data gathered from work on the Tarras & Calas Railroad, of Spain:

CONCRETE PIERS FOR BRIDGES.

Name.	Length.	Height of piers.	No. of spans.	Quantity of building.	Time taken to build.
	Yds.	Ft.		Cu. yds.	Weeks.
Tamajoso River.	145	23	12	1,737	14½
Oraque.	141	31	11	1,590	15
Cascabelero.	160	30 to 80	10	2,680	21
No. 16 (Valley).	98	28 " 50	7	1,046	10½
Tiesa.	55	16 " 23	8	420	4

Several advantages of this method of construction are presented, one that of time, which seems incredibly short (see table). Another is its cost, which is very much lessened by the two elements, material and labor. There is no waste of material, for all the stones, large and small, can be used; they can be quarried cheaper than blocks and require very little dressing the work can be carried out largely by unskilled labor with great rapidity and economy. In the use of stone that could not be quarried in blocks and that therefore required an unusually large amount of concrete, the average proportion of concrete used in bridge piers is reported as about 70 per cent., and in one case, where the stones were quite small, 76½ per cent. In other work the proportion has been as low as 55 per cent. The average quantities of materials required to make one cubic yard of masonry are given as:

.30 cu. yds. rubble.
.69 " broken stone.
.34 " solid stone (not dressed).
.36 " sand.
.18 " Portland cement.

From this table comparisons may be made with the cost of other classes of masonry.

But it is further claimed that the volume of a rubble concrete structure built after this manner may be 70 per cent. of that of ordinary masonry in lime mortar, and still have greater strength, and that therefore, in order to make a fair comparison of the cost of rubble concrete with ordinary masonry, 25 per cent. should be de-

Second Wreck of a Trestle in Deep Water.

The long trestle of the Intercolonial Railway, in Halifax Harbor, was again wrecked on the morning of July 23. It is said that more than half of the western portion fell. A considerable portion of this trestle was wrecked by a hurricane accompanied by an unusually heavy tide on the night of Sept. 7, 1891. In that storm the tide was 5 ft. higher than usual, and the wind blew from such a quarter that the bridge was exposed to heavy seas coming directly in from the ocean. The bents were generally left standing, and the bridge was repaired so as to be passable in about two months. This bridge was illustrated and described very fully in the *Railroad Gazette* of April 9, 1896, and certain of the illustrations were repeated on the occasion of the former wreck in our issue of Oct. 2, 1891. The trestle bents stand in deep water, the extreme height being 90 ft. from rail to harbor bottom. They are built in four stories, very substantially constructed and anchored by cribs weighted with stone ballast. The deep water extends about 650 ft., the Narrows being at that point about 1,500 ft. wide. The total length of the bridge is 2,050 ft., 1,204 ft. being on piling, 650 ft. on trestles in the channel and the remaining 196 ft. being a steel swing bridge. The bents were constructed and floated to the site and then drawn down to their seats on the cribs by lines passed through sheaves attached to weighted anchors on the bottom. The construction of this part of the bridge occupied about three months and a half, during which time there were some severe gales.



ESTABLISHED IN APRIL, 1856.
Published Every Friday,
At 73 Broadway, New York.

EDITORIAL ANNOUNCEMENTS

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

The Lake Street Elevated Railroad in Chicago is to use compound locomotives. Twenty of these are about ready for delivery at the Rhode Island Locomotive Works. These locomotives have the Rhode Island starting gear, already described in the *Railroad Gazette*, which gives the engineer the power to run the engine single expansion as long as it is desired at starting. This order for compound locomotives for elevated railroad work seems to settle the question of the value of compounds for this class of service. This road in particular is one where compound locomotives were at first decried as being wholly inadequate and ill adapted for the service. The change of heart in this matter undoubtedly has been the result of an impartial investigation into the action of such compound locomotives as are already in service on elevated roads. There is no service, except heavy freight work, so well adapted for compounds as elevated railroads, where it is necessary to muffle the exhaust, to reduce the noise, and to start trains from a stand-still about $2\frac{1}{2}$ times per mile. During the starting of the engine, the steam in a single expansion engine is used at great disadvantage, while in the compound considerable expansion is obtained, and there is less waste. The saving in back pressure by the removal of the muffler is considerable. Besides these chances for saving, the blast is not so hard on the fire and less cinders are thrown. Elevated railroad service for a locomotive consists in starting out with full power and accelerating as rapidly as possible, and then running for a little time at a short cut-off. Then comes the application of the brakes, the stopping of the train, and a start all over again. It is evident to any one who will examine the service that compound locomotives ought to save considerable in elevated railroad work, and altogether it would appear that the future elevated railroad locomotives will be compounded.

We owe an apology to Messrs. Walker and Seargeant, authors of the "World's Railway Congress" papers printed in the *Railroad Gazette* of July 7 and 14, and to our readers as well, for not calling attention to those articles; especially as they appeared in issues loaded down with an unusual quantity and variety of matter. The first paper is an excellent summary of the salient facts bearing upon the most vital conditions affecting the construction of new railroads in this or any country, and at the same time a succinct presentation of the essential difficulty in settling the always present "rate problem." Colonel Walker does not enter into any extended discussion of the remedies or the evils which he so clearly sets forth, contenting himself with a close adherence to the subject as indicated by its title as assigned to him by the officers of the Congress, but he points out the principal remedial measure that is at present possible, the repeal of the fifth section of the Interstate Commerce Law. With that out of the way rival railroads could make

agreements to refrain from disastrous competition in such a way that the agreements would stand, while, as every one knows, the danger that such agreements would destroy or impair healthy competition is now very remote.

Mr. Seargeant's paper is valuable as a condensed account of facts of English railroad management which are otherwise obtainable only by much research. The superannuation funds of English roads are quite different from the relief funds of the Baltimore & Ohio, the Pennsylvania, the Burlington and other roads in this country, in their more limited scope and their rigid compulsory features, but they nevertheless afford a valuable field for study by American railroad directors. The real merits of this or any kind of "paternal" arrangement for giving to railroad employees the benefit, in their small financial affairs, of the stability and credit of the employer's large resources, have never been fully discussed in this country, and every person interested will wish to avail himself of every means of real information on the subject. In consequence of the comparative newness of this country there are doubtless more employees here, than in England, who intelligently prefer to make a wholly unconditional contract for their wages; there are many others who prefer to take every cent of their money into their own hands as soon as it is earned, without giving much thought as to whether that is the best course, and still others who will join the last named class from sentimental reasons or simply because a "labor leader" tells them to. Whether all these people will ever come to an agreement of view which shall lead to the general adoption of either superannuation or sick-benefit fund schemes remains to be seen. It is undeniable that the Funds now in operation in this country are considerably tinged with compulsoriness, in spite of their names. Promotions often are affected by a man's membership or non-membership in the Fund, and candidates for employment from outside the service doubtless feel the same influence. In so far as this is true it precludes any accurate estimate of the employees' motives in joining, and the success of the existing institutions therefore affords only partial evidence of the equity and justice of the principles on which they are based. It is true that any joint arrangement between a railroad and its employees has an important and far reaching secondary or reflex influence in the promotion of acquaintance and good feeling, and it may well be that this would outweigh the evil even of an unjust financial arrangement; but it is possible to over-rate this element.

The Erie Receivership.

The announcement that the Erie has been put in the hands of receivers is not a surprise to those who have been familiar with its affairs. It has been a matter of common knowledge that the floating debt is very large, and that the present management has been able to provide for maturing obligations only because of the confidence which financial men have in the ability and character of the men at the head of Erie affairs. Of course the actual financial condition of the country has made it increasingly difficult for the management to provide money to meet its obligations and has prevented arrangements which a short time ago were nearly completed, for a loan which would have provided for the floating debt and would have furnished money for needed betterments. Therefore the receivership has not only been expected by those well acquainted with the Erie, but is welcomed by many of its best friends. It takes the affairs of the road out of "the street" and prevents the control of its obligations passing into the hands of men who might have used that control to injure very greatly the property and the interests of the security holders. The present step will protect the owners and the creditors until the situation clears up so much that some kind of a reorganization can be brought about.

The Receivers are the men who have for more than eight years been in entire control of the property, namely, John King, President, and J. G. McCullough, Chairman of the Executive Committee of the Board of Directors and President of the Chicago & Erie, the control of which is owned by the Erie proper. The present management has, and well deserves, the confidence of well-informed financiers. It has been singularly wise, plucky and resourceful; it has done all that could be done to put the property on a sound basis. The economies under Mr. King's presidency have been rigid, but they have been intelligent, and the physical condition of the road has been steadily improved. New motive power and rolling stock has been added; new and heavier rails have been put down; a good deal of track has been ballasted with stone, and the operation of the road under the block system has

been gradually extended, until now it covers the whole line from New York to Chicago. In fact the road has been put in a condition for safe and economical operation. Meanwhile the gross and net earnings have steadily increased. For the whole system, including leased lines, the results of operation, expressed in millions of dollars, have been:

	Gross earn.	Due leased lines on Percentage	Op. exp.	Net earn.
1885	\$20.8	\$1.9	\$14.3	\$4.6
1886	24.8	2.6	16.4	6.1
1887	26.6	2.4	13.4	6.8
1888	27.2	2.3	15.0	6.8
1889	27.0	2.4	17.9	6.7
1890	29.1	2.6	15.5	6.9
1891	30.1	2.6	20.2	7.3
1892	31.3	2.6	21.5	7.2

The increase in gross earnings in 1892 over 1885 was 50 per cent., and the increase in net was more than 56 per cent. This illustrates the growth of the system in earning capacity. Of course this was not without an increased mileage, but the gross and net earnings per mile show increases of 24 per cent. and 29 per cent. respectively.

While these results have been brought about, that is, a great improvement in the physical condition of the system and in its earning capacity, the expenditures for construction and new equipment were nearly \$8,500,000 and the increase in the funded debt only \$2,375,400. This last was the issue of the funded coupon bonds of 1885 and was an inheritance from the former administration. The difference in the floating debt which has taken place in this time could only be ascertained and stated by an amount of investigation and of explanation for which we have neither the time nor the space. The present floating debt may be put at:

Loans and bills payable	\$4,306,000
Current liabilities	3,367,000
Total	\$7,673,000
Less materials and supplies on hand	1,100,000
Balance	\$6,573,000

What the result of the receivership will be of course one can only conjecture. The Erie has a bonded debt that it is not capable of carrying. That is, with 551 miles of first track and 280 miles of second track on the Erie proper there is a total funded debt of \$77,643,885, carrying an annual interest of \$4,680,781. The bonded debt per mile is, therefore, \$140,000, and the interest charges \$8,495. Fixed charges have been earned ever since the present management came in, but it is under a terrible strain and working very close to the margin. It does not permit the improvements necessary to preserve the property, under the intense competition to which it is subjected, and it puts the payment of dividends on the common stock out of all question. The final result one would suppose must be a reorganization wiping out some of the funded debt and reducing interest charges. Over 23 millions of the existing bonds bear 7 per cent., and over 39 millions more carry 6 per cent. That a readjustment will come eventually one can hardly doubt; that it will come as the immediate result of the present receivership it would be dangerous to predict; but it ought to.

The Union Pacific Discrimination Case.

Among the last decisions handed down by the Supreme Court of the United States before its recent adjournment was one of special concern to the citizens of Colorado, but of far wider interest and importance to the country at large than the average railroad case going up from the Courts of that or any other State. We refer to the action brought by Goodridge & Marfell, coal merchants, of Erie, Col., against the Union Pacific, to recover damages for unjust discrimination in freight upon coal from Erie to Denver.

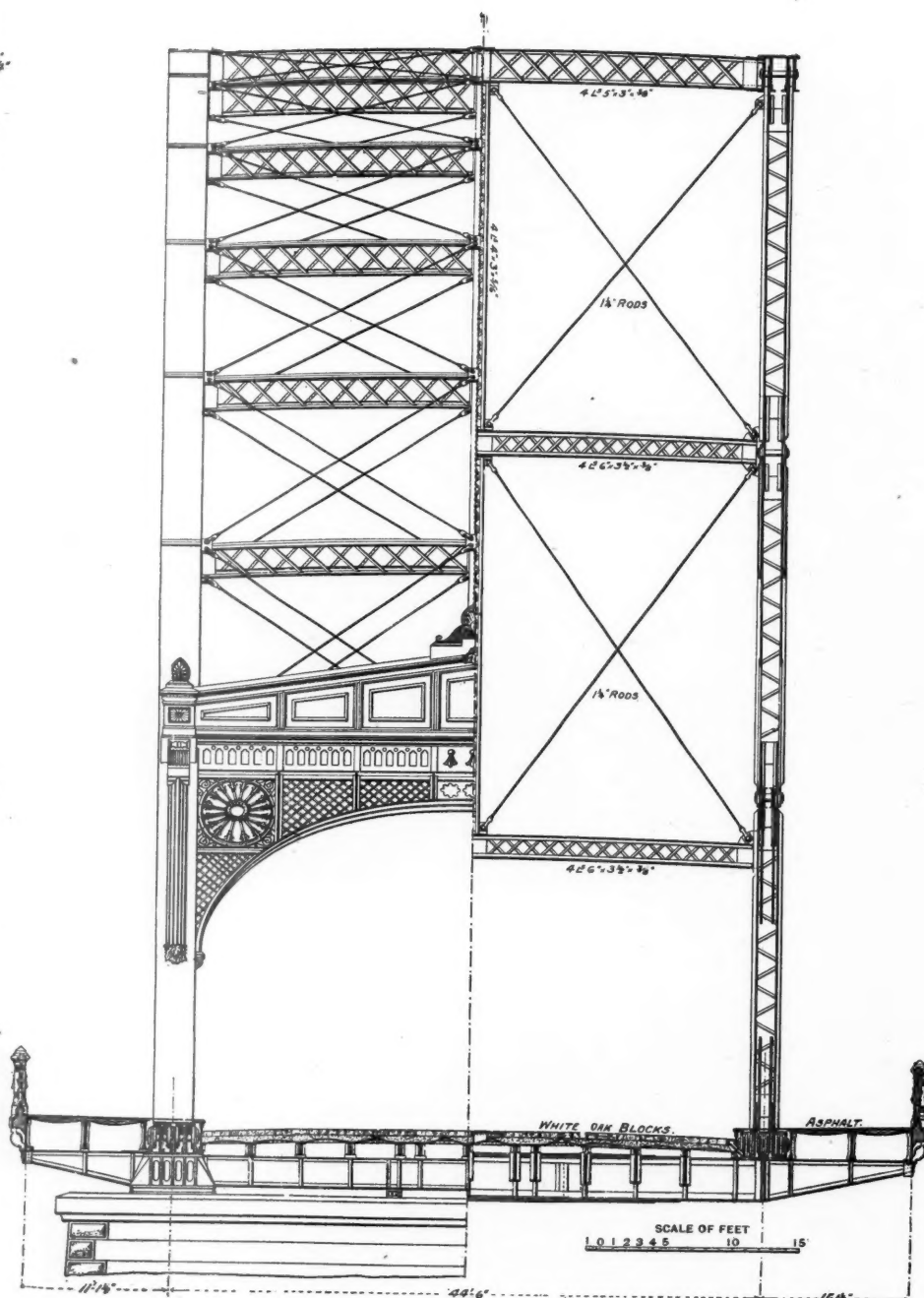
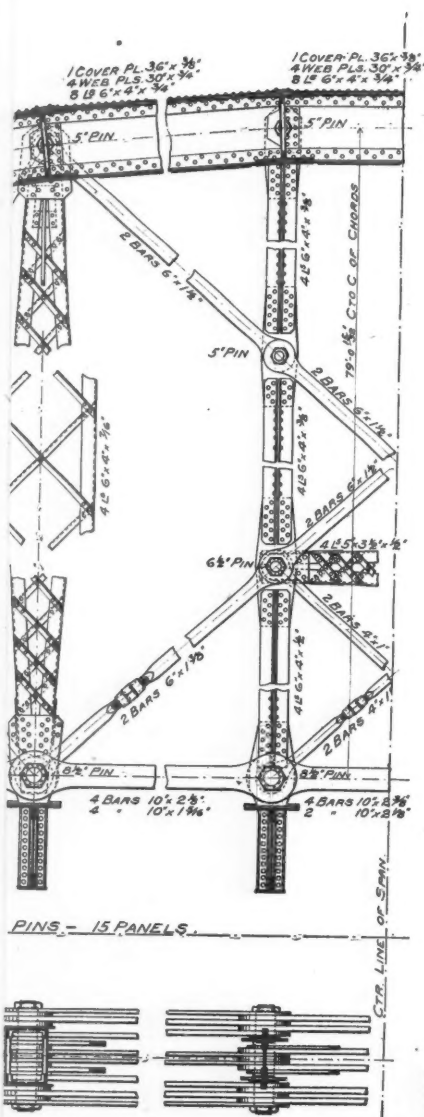
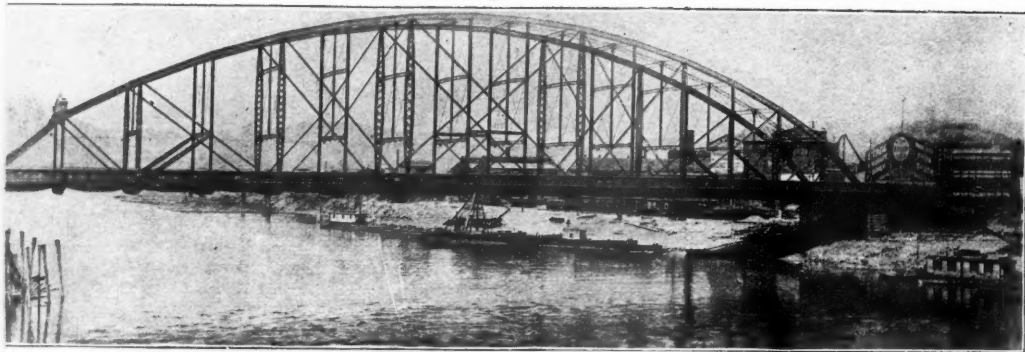
This matter of unjust discrimination by common carriers had reached such a stage of development in Colorado that it was deemed best to direct against it the heaviest ordnance a people can command, and a clear-cut provision prohibitory of unreasonable discrimination was, years ago, ingrafted into the State constitution. But it was left to the legislature of 1885 to enact a law specially dealing with the subject, and with considerable clearness and brevity to provide a system of supervision over railroads enforcing the constitutional provisions referred to.

Beyond its being unusually well drawn, this act is hardly different in principle and purposes from the laws of the various other States, and in common with them it provided for the recovery of damages in favor of any one who had suffered from the discrimination which the statute described and forbade. By this law, any offending carrier forfeits to the person aggrieved, in every case of unjust discrimination, three times the actual damage sustained or overcharges paid, together with the cost of suit and a reasonable attorney's fee, to be fixed by the court.

Goodridge & Marfell received their coal at Erie, and transporting it by the Union Pacific, sold it at Denver,



Mr. THEODORE COOPER, M. Am. Soc



GE, PITTSBURGH, PA.

C. E., Engineer.

They paid the published rate, \$1.00 per ton, for years, when they discovered that the Marshall Consolidated Coal Company, operating coal mines at Marshall, two miles nearer, if anything, to Denver, had been shipping their product over the Union Pacific to Denver at 60 cents a ton. Alleging that there was nothing to justify the discrimination, Goodridge's firm sued the company for the statutory penalty and claimed as damages three times 40 cents for every ton of coal they had shipped and paid for while this discrimination existed.

The defense of the Union Pacific officers was somewhat peculiar. They denied that the Marshall company paid them less than \$1 a ton, and in support of this set forth that they had made a five years' contract with that company, by which they were to receive \$1 per ton, unless 200,000 tons were furnished for transportation each year, in which case a rebate of 40 cents would be given, with a corresponding reduction in case the regular tariff was reduced below \$1.

The company also set forth as an additional consideration for this rebate that a claim for damages for upwards of \$60,000, on account of the negligence of the original constructors of the railroad whereby the Marshall coal mine had been injured, had been released to the company on account of the rebate. This claim had been in litigation for years, had never been finally established, and, besides, it did not appear why, in the subsequent foreclosures of first mortgages, it remained a claim against the property in the hands of subsequent purchasers.

The Circuit Court found in favor of the plaintiffs, and the Union Pacific challenged the accuracy of this result by an appeal to the Supreme Court. There Justice Brown delivered the unanimous opinion of the Court, which affirmed in all things the judgment of the Circuit Court in favor of the plaintiffs.

Justice Brown points out that the defense was clearly defective from a technical standpoint if for no other reason, in failing to allege and prove that the Marshall company had actually furnished for transportation 200,000 tons or over each year. But the weighty reason for upholding the judgment of the lower court was placed upon the stronger ground that the claim for unliquidated damages against the Union Pacific was too vague, uncertain and speculative to furnish a good consideration for the rebate.

It is quite apparent from the law itself, and the opinion of the Court implies, that all discrimination is not forbidden; it is only an unjust or unreasonable discrimination that the statute aims at. The burden of a party suing under the act is not discharged by showing a discrimination. He must make it appear to be unjust. And what constitutes an injustice in discrimination must, in the absence of special statutory definitions, always remain a question of fact, or perhaps a mixed question of fact and law, to be determined by the circumstances of each particular case.

The rule to be deduced from the Union Pacific case is that a carrier cannot be allowed to set up a consideration of straw or a sentimental consideration, and on the strength of it, deal out rebates to favored customers. Nor can the consideration be eleemosynary in character. In this very case, it appeared as a sort of make-weight to the defense, that the rebate was partly based on the ground that it cost the Marshall company more to mine its coal than it did the plaintiffs and others, and therefore the carrier, as a sort of commercial Lady Bountiful, had allowed the rebate, to even things up somewhat and enable the favored one to compete profitably with the rest of the trade.

A reason of this kind could hardly have been seriously advanced, but the Court, as if in retaliation for the affront to its economic sense, was quick to seize the fallacy and shake it until its very entrails fell out. In this connection, the Court says: "The statute recognizes the fact that it is no proper business of a common carrier to foster particular enterprises, or to build up new industries, but deriving its franchise from the legislature, and depending upon the will of the people for its very existence, it is bound to deal fairly with the public, to extend them reasonable facilities for the transportation of their persons and property, and to put all its patrons upon an absolute equality." If this salutary and reasonable doctrine were generally observed, we should be spared many disastrous experiences of railroad properties diverted from legitimate uses and appearing again before the public fleeced and bankrupt.

With due respect for the opinion of Mr. Justice Brown, we think the defense of the rebate on the ground of a 200,000-ton shipment each year was entitled to no consideration whatever, standing by itself, even if it had been proved. If this were a sufficient answer to the charge of rebating we should then be compelled to uphold this vicious system whenever a customer got rich enough or strong enough, by com-

bination or otherwise, to make a shipment of sufficient size to influence the scale of rebate. In other words, the rich and powerful would be favored, and the small shipper would go to the wall, which is the very evil all this legislation was designed to repress. The decision of the Interstate Commerce Commission in the Providence & Worcester coal case in 1887 set forth the true principle in this matter, and it will be well if that decision stands unimpaired; and this is not saying, by any means, that the wholesale-and-retail principle has no place in railroad rates.

From the tone of the decision in this case, it appears that if the Union Pacific had established the fact that the Marshall company had a definite and legal claim against the road to the extent of \$60,000, and those rebates were allowed to pay off that claim in good faith, the plaintiffs could not have succeeded in their action.

Press dispatches printed all over the country the past week have referred to this case as sustaining the legality of legislative control over railroad rates, of the exercise of such control through the medium of a commission, and of the requirement that railroads get specific permission from a commission for specific deviations from a tariff which is *prima-facie* reasonable. If the writer of these dispatches had used concrete instead of abstract terms he would have said that the decision reverses the recent decision of Judge Newman at Atlanta, on the long and short haul law, and that it sustains the power of the Interstate Commerce Commission to prohibit the use of higher rates for shorter distances until they are shown to be harmless. But Justice Brown says hardly a word on any of these points. His only definite expression is a recognition, by implication, that it is "a fact" that railroads must deal justly, etc. (See third paragraph above. Justice Brown is an adept at sticking to his text. But his omission to say anything *against* these provisions of the Colorado law may fairly be regarded as sustaining the principles involved in them, and the friends of the Interstate Commerce Commission are entitled to the comfort obtainable from this fact. Unfortunately the trouble with this part of the Interstate Commerce law is not its illegality, but the difficulty of applying it to the complex conditions which we find in this country.

Malleable Iron vs. Cast Steel for Couplers.

In the *Railroad Gazette* last week was published a letter from "Steel Coupler," criticising our conclusion that the best malleable iron is "vastly better than the average cast steel for coupler heads" (not, be it observed, the average cast steel coupler heads). But we also said that "cast steel is a much stronger material than malleable iron and can be made into couplers that will greatly exceed the proposed requirements." "Steel Coupler" thinks that we should have averaged all of the couplers tested, regardless of the different brands of steel, but we do not consider this fair, for we are, in this test and this discussion, dealing only with the material for couplers.

At Chicago there were many steel couplers, but only four brands of cast steel represented, and two special brands of malleable iron. Both of the special brands of malleable iron stood the test better than three of the brands of steel. Three of the four brands of steel gave quite bad results. Both of the special brands of malleable iron gave excellent results. At Altoona four brands of steel were entered. Two brands stood the test and went far beyond it. The other two brands were very ordinary, and did not average as well as the special brands of malleable iron. The averages are as follows: Two special brands of malleable iron, $7\frac{1}{2}$ blows; two out of four brands of steel, $3\frac{1}{2}$ blows. The average number of blows for the special brands of malleable iron was $7\frac{1}{2}$ blows, or $2\frac{1}{2}$ more blows than the proposed test, hence the average special brands of malleable iron met the test while the two ordinary brands of steel did not meet the test.

As to the justice of comparing the best malleable iron with the average of steel, perhaps that is a matter of opinion, but as we look at it every one knows that the average cast steel is a stronger material than average malleable iron, and a comparison of these grades of material is unnecessary. Every one knows that the best cast steel is stronger than the average malleable iron or best malleable iron, and we said so at the time of the publication of the conclusions which are criticised. The only comparison that remains is that of average cast steel with the best malleable iron, and that comparison was made mainly for the reason that many had claimed that "any reasonably good cast steel is superior to the best malleable iron." These were our reasons for making the comparisons between the average of one material and the best of the other, having in mind the feelings of not a few people before the Chicago tests, namely, that the best malleable iron

was not a sufficiently strong material to make a vertical plane coupler within the limit of weight of 220 lbs., to meet the proposed test; those tests then being considered as probably too severe. The comparison of the two materials on an equal basis of grade was also given in full, and in perfect justice it was said that "cast steel is a much stronger material than malleable iron and can be made into couplers that will greatly exceed the proposed requirements."

One advantage of malleable iron for car couplers is that it can be cast perfectly solid and free from blow holes, and malleable iron castings as a rule are more uniform and can be made more uniform with less attention in manufacture than steel castings. One of the toughest brands of cast steel that has been used for car couplers is pretty well honeycombed and has a very suspicious appearance, but it is, in fact, a good strong material. The softer the steel, as a rule the more difficult it is to make solid castings. So far only one steel company has succeeded in turning out any considerable number of cast steel couplers, with few blow holes, that will stand the test. It is a simple matter to cast steel solid, if softness and toughness are not demanded. A coupler is difficult to cast in steel, and a steel that will be solid when cast in other shapes and be soft and tough at the same time, often fails to be solid when cast in couplers.

Poor's "Manual" for 1893 gives the total railroads of the United States up to Dec. 31, 1892, as 175,223 miles, the net increase in the year having been 4,429 miles. The mileage at the close of the fiscal years of the companies was 171,806 miles of main line track. The liabilities of these companies were 11,089 million dollars, and the assets 11,482 millions. Full statistics of operation were received from companies operating 170,007 miles, and on these the following figures are based. The revenue train-mileage, exclusive of elevated railroads, was 865 millions; the passenger mileage, 13,697 millions; the freight ton-mileage 84,448 millions. The total traffic earnings were 1,205 millions of dollars, operating expenses 847 millions, net earnings 359 millions, other receipts 115 millions, and total available revenue 473 millions. The payments in interest amounted to over 239 million dollars, and in dividends to a little over 83 millions. The ton-mile rate for the year was .967 cent, which is somewhat better than the two preceding years, and nearly as good as the year 1889. The freight receipts per mile of railroad were the best since 1883, having been \$4.787. The tons of freight hauled per mile of railroad were 4,392, the highest figure ever recorded. The tons of freight per freight train-mile were 161.21—less than either of the two preceding years, but greater than in any other year. The average haul per ton was 112.7 miles. The average passenger fare was 2.143 cents per mile, being the lowest ever recorded. The receipts per mile of railroad were \$1,721 from passenger fares, which is less than most of the preceding ten years. The passengers carried per mile of railroad were 3,375 and the average train load 42.29. The interest paid on bonds and debt amounted to 4.38 per cent.; the dividends on stock to 1.68 per cent., and the total payments of interest and dividends to 3.01. The locomotive equipment at the end of 1892 is reported as 35,754; the passenger service cars at 34,221, and the freight cars 1,168,867. The miles of steel rail in track were reported as 182,853, being an increase of about 8,000 miles; and the miles of iron rails were reported as 33,641, a decrease of 1,100.

The half fare excursions from trunk line territory to Chicago seem to have been moderately successful thus far. The Erie's train left New York on Monday with 215 passengers and arrived at Chicago with 790, the additional customers evidently having been picked up between Jersey City and Salamanca. The Baltimore & Ohio on the same day started out with 130, but made large additions at Philadelphia and other places. The Pennsylvania train, on Tuesday, had only 125 passengers leaving Philadelphia, and it was merged with a regular train at that point. The New York, Ontario & Western took over 200 from New York, and the West Shore 136, but both these roads took on considerable numbers in New York State. The Lehigh Valley train started with 65. The Baltimore & Ohio train suffered a disastrous wreck near Monroe Falls, O., on the Pittsburgh & Western Tuesday morning about four o'clock. Thirty passengers were injured, five seriously. The fact that the derailment was caused by "spreading of rails" on a curve indicates that there was reckless running or bad track, but it does not appear that this train was any different or differently treated from other passenger trains, and we can hardly see the appropriateness of an editorial in a New York daily paper explaining that the road probably has no special animosity against cheap-rate World's Fair excursionists. The day-car excursions from St. Paul were not well patronized, and, as appears from the foregoing figures, the popularity of such schemes is not well settled. Possibly the passenger agents have themselves injured the business by their reiterated asseverations that the day cars would be clean, well cared for, etc. They have done this a good deal at New York and one newspaper even assumes that on the return, no special

trains being run, passengers will have to put up with some little hardship. But the fact is that the through trains, whether special or regular, afford first class accommodations on all the lines, whether westbound or eastbound. The only hardship is the impossibility of lying down, and that is just as bad going as returning.

The maximum freight rate bill in Nebraska is troubling those who secured its passage about as much as it is the railroads whom it was intended to hurt, and the former are now pleading for its repeal, before it goes into effect. In brief, they have discovered that in some cases the railroads may advance instead of reducing rates. For example the present rate from Chicago to Lincoln, Neb., is 80 cents per 100 lbs. first class, and to Omaha 75. But the roads can, of course, charge local rates from Omaha to Lincoln, 23 cents, making the rate 98 cents from Chicago to Lincoln. This the merchants of the latter city have discovered, and seeing the impossibility of competing with Omaha merchants under such conditions they are now asking the Governor to call an extra session to repeal the foolish law they were so anxious to have enacted. Their efforts for repeal are also seconded by the merchants of every other town in the state that seeks to compete with Omaha. It is not likely, however, that the Governor who signed the act in the face of vigorous protests will be in a hurry to acknowledge his folly by calling an extra session. The railroads have been a good deal at sea, the traffic managers having been engaged for a long time in trying to discover the balance between the advantages and disadvantages on different divisions and roads. Some, at least, have finally concluded that the effect of the law will be to force an unreasonable reduction of income, a press dispatch of Tuesday stating that the Burlington and the Union Pacific have applied for an injunction to restrain the state from enforcing the law. The date for it to become operative is Aug. 1.

The engine tests to determine the efficiency of the exhibits of engines and boilers at the World's Fair in Machinery Hall are now in progress. The engines and boilers represented are the most modern used in stationary work. The engines are practical machines of the kind that is recommended by the different builders for the highest efficiency; there are some, however, that are simpler, and rated as ordinarily efficient. There has never been a time when so much could be learned, with so little trouble, about the relative merits of different kinds of boilers and engines as now at the World's Fair, yet it is understood that unless greater interest is shown by engine builders and engineers generally, particularly the engineering societies, regarding these tests, they will not be as complete as they ought to be. There is no branch of mechanical engineering where complete knowledge is more profitable, and, indeed, necessary, than that which has to do with boilers and steam engines, and this opportunity ought to be saved, even if it requires a combined appropriation from the different engineering societies to pay the expenses. There is some talk of an appropriation being made by the American Society of Mechanical Engineers, but the results will be equally important to mining and electrical engineers, and ought not to be of minor importance to civil engineers. A movement is on foot to induce these societies, by combination, to meet the expenses of more extended tests than can be made without such combination.

One of our English contemporaries says that "it is stated that speeds of 80 miles, 90 miles and finally 112 1/2 miles an hour have been attained on American railways. It may be taken for granted that these statements have foundation in fact." Probably our contemporary would be astonished to know that a speed of 90 miles an hour is reached every day for very short distances on one railroad in the United States, and this with trains of four, five and six cars. We have not inspected the performance sheets, but we are assured on excellent authority that such is the case. The probable weight of one of these six-car trains is about 270 tons. Our contemporary then goes on to consider the "bursting effort" of an engine going around curves, and calculates that at 100 miles an hour this "bursting effort" on a curve of 660-ft. radius would be a little more than equal to the weight of the train. "Thus, with a 65-ton engine this bursting effort would be 65 tons. Hence, it approaches perilously near to what would suffice to overturn an engine bodily." The writer concludes that "while speeds of 100 miles an hour may be regularly attained on railways, we not only believe, but know, that they can only be reached to safety on tracks especially constructed for the purpose." We hasten to assure the editor that these prodigious speeds are not made on curves in this country; but we call the attention of Mr. Buchanan, Mr. Bly, Mr. Paxson, Mr. Vaucain and other reckless Yankees to the note of warning which the English editor has sounded.

The grade crossing trouble in Chicago is intensified in this World's Fair season. Of course the street cars are crowded and run as close together as they can, while the railroad trains are more than usually irregular. The men employed as gate tenders are not of a very high class, many of them being cripples whom it is very proper that the railroad should provide for, but who are not very active in body and seem to lose gradually

their sense of duty and responsibility. It has been suggested that the gates should be connected up so that one set of gates should be worked by two independent towers, particularly where one man is supposed to control the gates at a crossing 8 or 10 tracks wide. In such a place it is impossible for one man to see all of the tracks as completely as is necessary for safety. Evidently the railroads will have to take a little more pains to protect the crossings if public opinion is to be kept at even a reasonable heat.

NEW PUBLICATIONS.

The Official Railway List; 12th annual edition, 1893. Chicago: Railway Purchasing Agent Co., The Rookery. Price \$2.

We refrain from any description of this list or of its contents, because it is familiar to everybody who has use for such a list. We also refrain from our twelfth annual request that the titles of the officers whose names are given should be printed in a different type from the names themselves. We have private information that while our opinion on this subject is respectable and respected, there are practical reasons why it cannot be allowed to govern the compositor in this matter.

The Locomotive.—A chapter from Röll's *Encyclopädie des gesamten Eisenbahnwesens*. By Herr Schrey. Herr Schrey's chapter on "The Locomotive" has been printed in a separate pamphlet. It is a very excellent example of German scientific work, studious, accurate and comprehensive. It describes the development of the locomotive from the earliest engine to the present time, giving careful explanations of the evolution of the machine, in power, speed and performance, comprising every variety in use. The author considers details of construction, tractive power, tests of locomotives, their care and operation and gives statistics of the dimensions of characteristic locomotives in various countries giving much space to American engines. The chapter closes with a chronology of improvements in locomotive construction. The historical part is divided into two periods, one from 1804 to 1813, and the other from 1813 to the present time. There are illustrations of characteristic locomotives and details, especially of German make; although the Pennsylvania class P and the fast express engine of the Midland of England are illustrated.

Railroad Matters in Chicago.

Freight Traffic.—The officers of the leading Western lines centering here were agreeably surprised at the result of last week's inward freight traffic. All had expected that the very low prices for grain, and the fact that the country shippers had been advised by city receivers to hold such property back until quotations improved, would materially check shipments. The result, however, shows that the only grain which failed to come forward in materially enlarged volume was wheat, the arrivals of which were only a trifle larger than during the preceding week, and 421,000 bushels less than the corresponding time last year; while the deliveries of other grains aggregated 4,285,000 bushels, against 3,126,000 the preceding week, and 3,516,000 the third week in the month last year. Other descriptions of inward traffic were also better than anticipated, but the situation was less favorable with out-freights to the interior. There is an almost continuous shrinkage in such business, and the demand for goods for current consumption has decreased since the first of the month. Country merchants are also backward in ordering goods for the fall trade.

The grain traffic at other Western centers was also more satisfactory. The increase at eight points, including Chicago, aggregated 1,954,000 bushels over the preceding week, and was 388,000 over the third week in July last year. This increase is the more surprising from the fact that the movement of wheat a year ago was enormous, whereas now it is very moderate.

The live stock traffic here showed a very small decrease from the preceding week, but it was close up to this time a year ago, and there was also an excess of 1,523 tons of dressed beef. Managers of roads traversing the live stock sections bordering on the Missouri state that the slaughtering industry at Omaha and a few other points on that river is developing largely, and that, instead of shipping cattle on foot in such large numbers as in previous years, a very good percentage will be slaughtered at the points indicated, and go East in the form of dressed beef.

The following exhibits the aggregate deliveries of flour and grain by 11 roads centering here for the first three weeks the current month, and corresponding time in 1892; also the amount brought by each road:

	1893.		1892.	
	Flour.	Grain.	Flour.	Grain.
C. & N. W.	Bbls. 29,683	Bush. 1,451,000	Bbls. 38,019	Bush. 1,737,000
Ill. Cent.	3,450	2,226,000	175	1,013,000
C. R. I. & P.	94,300	1,061,000	11,500	1,718,000
C. B. & Q.	36,340	3,008,000	24,891	2,290,000
C. & Alton	2,717	360,000	21,415	614,000
C. & E. Ill.	300	262,000		333,000
C. M. & St. P.	53,150	1,161,000	50,773	1,479,000
Wabash	600	591,000	3,940	510,000
C. & G. W.	33,412	393,000	68,111	787,000
A. T. & S. Fe.	13,294	459,000	545	1,138,000
Wis. Cent.	1,363	4,000	1,980	4,000
Totals	201,082	10,995,000	223,055	11,583,000

It will be seen by the above that the Burlington maintained its position as the leading grain carrier, also that, although there was a total shrinkage of 591,000 bushels from the same week last year, the Burlington gained 718,000 bushels. This was entirely in coarse grain, while the shrinkage shown by the Northwestern, Rock Island and St. Paul was caused by the light movement of wheat, the decrease the three past weeks from the same time in 1892 being 1,079,000 bushels. The decrease in the flour traffic is due to the fact that rates made from Minneapolis to the seaboard by the "Soo" and other routes are lower than Chicago roads will accept, as there is no profit in it.

Passenger Traffic.—The passenger traffic the past week, although large as there were legitimate reasons for anticipating, was not equal to the carrying capacity of any of the roads centering here, and the officers of some lines were inclined to complain decidedly of the result. Others said their business was quite as large as they had a right to expect, especially so when it is considered that the high temperature is not calculated to induce those who have comfortable homes in the interior to abandon them for the purpose of visiting the World's Fair, when they are assured that they can have the same privilege under more favorable conditions.

The claim of the city press that the refusal of the Western railroads to make cheaper rates for visitors to the World's Fair is decreasing passenger traffic is denied by the majority of managers, who state that they carried as many people as during the preceding week. They also back their assertion with figures showing that for the week ending July 22 the number of paid admissions to the Fair aggregated 59,349, against 541,989 the preceding week, showing an increase of 51,507. The fact that the reductions made to Indiana and Ohio points at the close of the preceding week failed to materially increase travel over other lines making one fare round trip, is likewise cited as proof that the people are not kept at home by the cost of transportation. It is likely, however, that ere the close of the current week the Western roads will make reduced rates from about all points. As stated in last week's letter the managers of the big roads having a large local traffic, except the St. Paul, are opposed to the reduction because they regard it as opposite to strict principles of business. In an interview with General Manager Merrill he expressed strong opposition to the reduction, and said that under no circumstances should it be made ere the close of August, while Manager Earling, of the St. Paul, was anxious for an immediate reduction, stating that he believed that the enlarged travel would materially increase profits. The Northwestern was reported as regarding the movement as a doubtful experiment. Manager St. John, of the Rock Island, said that if a reduction would double the receipts of the roads it might be policy to make it; he was, however, in favor of definite action, and opposed to continued meetings and wrangles over questions which should be settled at once. In addition to the belief of the opposing lines that reduced rates are not yet necessary to augment travel, they dread the general demoralization of rates and losses on local business which they regard as an inevitable fruit of lower rates on the conditions proposed by the lines that most persistently demand them.

Cutting Down Expenses.—The movement to retrench expenditures by reducing operating and other forces, of which mention was made in a recent letter, is more pronounced than at any time since the first steps in that direction were taken. General Manager St. John, of the Rock Island system, when asked what course he was pursuing, said he had been quietly at work examining the expense accounts on every department of his road for over a month, and that material reductions had been made; that over 300 names had been dropped from his pay rolls within the past week, and a further reduction would quickly follow. He had no choice but to reduce expenses to conform to the shrinking volume of his traffic.

General Manager Merrill, of the C. B. & Q., said his forces were being materially cut down, that he had just made a trip over his lines to see where savings could be made, and that he should continue to lop off expenses in every direction. It is, he said, "our only hope for offsetting reduced earnings brought about by the financial demoralization. A material saving will also be made independent of the curtailment of pay rolls, as they are not the only places where money can be saved without injury to the service."

General Manager Earling, of the Chicago, Milwaukee & St. Paul, said: "We have been reducing forces in a moderate way for weeks. I cannot say how many will be dismissed, but there will be a thinning out everywhere. Curtailments will also be made in other directions, as it is an imperative necessity that we should save money to offset decreasing traffic."

An officer of another road said: "We are reducing expenses by cutting down the names on our pay roll. I regret to discharge men, knowing that the market is overcrowded with unemployed labor of every kind, but unfriendly legislation has made the rates for transportation of all kinds so low that we are unable to earn expenses and fixed charges when the freight traffic is small as at present. If we were permitted to make reasonable rates we could afford to keep an extra force for a reasonable period when business is small. It is a pity that those who make laws to regulate charges are not compelled

to suffer the consequences of their folly, but unfortunately it falls on the innocent."

Investigations in other directions also discover that every railroad centering here is pursuing a similar course to those mentioned, although some lines are said to have offered employees in their machine shops an opportunity to work half time. By the system proposed, 50 per cent. will work alternate days, or weeks, as may be agreed upon, hence all will earn half wages. The Northwestern and Southwestern roads are said to be practicing even more severe economies than the Chicago lines, and at many points only sufficient forces are retained in the machine shops to do imperative repairs.

CHICAGO, July 24.

Papers for the Engineering Congress.

In our issue of July 14, page 523, we gave a list of the papers that had been accepted for Division A of the International Engineering Congress. This is the Division, it will be remembered, which is in charge of the American Society of Civil Engineers. The papers that have been prepared and accepted for other divisions are in part as follows:

Division B, Mechanical Engineering. In charge of American Society of Mechanical Engineers. F. R. Hutton, Secretary.

Report of Committee on Standard Methods for Testing Efficiency of Locomotives.

Contribution to the Theory of the Steam Engine. By D. Dwelshauvers Dery.

The Working of Centrifugal Machinery. By G. Hermann.

Removal of Dust in Workshops. By R. Korfal.

A General Engineering Classification and Index. By William L. Chase.

Performance of Street Railway Power Plants. By Wm. A. Pike and T. W. Hugo.

Compression as a Factor in Steam Engine Governing. By F. A. Ball and D. S. Jacobus.

Anhydrous Ammonia Gas as a Motive Power. By T. W. M. Draper.

Notes on Drainage Machinery in the Netherlands. By A. Huët.

Tests of Purdue University Locomotive. By W. F. M. Goss.

The Limitation of Engine Speed. By C. F. Porter.

Compound Locomotives. By A. von Borries.

The Tachometer, or Fare Indicator and Controller. By C. Pieper.

On the Performance of a Triple Expansion Pumping Engine, With and Without Jacket. By Jas. E. Denton.

An Evaporative Surface Condenser. By Jas. H. Fitts.

Locomotives Operated by Total Adhesion. By A. Vallet.

The Refrigerating Machine of To-Day. By C. Linde.

Rod Mills and Their Development in America. By F. R. Dana.

Technical Education in the United States. By R. H. Thurston.

Experiences in the Working of Rack Railroads. By A. Schneider.

Haulage by Horses. By T. H. Brigg.

Apparatus for Metering Steam. By Franz Seiler.

Measuring of Water and Schmelz Meter. By F. Lux.

Improvements in the Art of Cable Making. By E. Guillemaume.

A Coal Calorimeter. By Geo. H. Barrus.

The Interchangeable System. By W. F. Durfee.

Division C, Mining Engineering, and Division D, Metallurgical Engineering. In charge of Institute of Mining Engineers. R. W. Raymond, Secretary.

The Detection and Measurement of Fire-Damp in Mines. By Prof. G. Chesneau, Paris, France.

Hydrogen-Oil Safety-Lamp. By Prof. Frank Clowes, Nottingham, Eng.

Experimental Investigations on the "Loss of Head" of Air-Currents in Underground Workings. By D. Murgue, Hesseges, France.

Tests of Hydraulic Cements. By Prof. H. Le Chatelier, Paris, France.

Genesis of Ore-Deposits. By Prof. Franz Posepny, Vienna, Austria.

A Remarkable Deposit of Ores of Wolfram in the United States. By Dr. Adolph Gurlt, Bonn, Germany.

Geological Distribution of the Useful Metals in the United States. By S. F. Emmons, Washington, D. C.

Lead and Zinc Deposits of the Mississippi Valley. By W. P. Jenney, Deadwood, S. Dak.

Origin of the Gold-Bearing Quartz of the Bendigo Reefs, Australia. By T. A. Rickard, Denver, Col.

The Bertha Zinc Mines. By W. H. Case, Bertha, Va.

Improvements in Ore Dressing. By Oeberbergrath O. Bilharz, Berlin, Germany.

Hauling of Large Quantities of Iron Ore. By John Birkbine, Philadelphia, Pa.

An Improved Hanging Compass. By Guy R. Johnson, London, Va.

Mining and Mineral Statistics. By C. Le Nève Foster, Llandudno, Wales.

Utilization of Anthracite. By Eckley B. Cox, Drifton, Pa.

Coke and Natural Gas. By Jos. D. Weeks, Pittsburgh, Pa.

Mining Schools. By Prof. S. B. Christy, Berkeley, Cal.

DIVISION D—METALLURGICAL ENGINEERING.

Microscopic Metallography. By S. Osmond, Paris, France.

Micro-Structure of Ingot Iron in Cast Ingots. By Prof. A. Martens, Berlin, Germany.

Segregation and Its Consequences in Ingots of Iron and Steel. By Alexandre Pourcel, Paris, France.

Micro-Structure of Steel. By Albert Sauveur, S. Chicago, Ill.

Review of American Blast-Furnace Practice. By E. C. Potter, Chicago, Ill.

New Direct Process for the Production of Pig and Refined Iron. By Alexander Sattmann, Donawitz, Austria.

Sulphur in Cast Iron. By W. J. Kepp, Detroit, Mich.

The Bessemer Process as Conducted in Sweden. By Prof. Richard Alerman, Stockholm, Sweden.

The Open-Hearth Process. By H. H. Campbell.

Blowing-Engines. By Julian Kennedy.

The Limitations of the Stamp-Mill. By T. A. Rickard, Denver, Col.

Experiments on the Specific Gravity of Gold Contained in Gold-Silver Alloys. By Henry Louis, Singapore, Straits Settlements.

Summary of American Improvements and Inventions in Ore-Crushing and Concentrating, and in the Metallurgy of Copper, Lead, Gold, Silver, Nickel, Aluminum and Zinc. By James Douglas, New York City.

Improved Slag-Pots. By H. A. Keller, Butte, Mont.

Consumption of Fuel in the Taylor Gas-Producer Plants at the Aspen and Maricopa Mills Compared. By C. A. Stetefeldt, San Francisco, Cal.

Electric Welding. By Edgar C. Moxham, Pulaski, Ky.

Alloys of Iron. By R. A. Hadfield, Sheffield, Eng.

Heat Treatment. By H. M. Howe, Boston, Mass.

Division E, Engineering Education. In charge of a Committee; Prof. I. O. Baker, Chairman.

Present State of Collegiate Engineering Education.

Mining Engineering. By Samuel B. Christy, Professor of Mining and Metallurgy, University of California, Berkeley.

Electrical Engineering. By H. S. Carhart, Professor of Electrical Engineering, University of Michigan, Ann Arbor.

Architecture. By S. Clifford Ricker, Professor of Architecture, University of Illinois, Champaign.

Mechanical Engineering. By the Committee in charge of Division.

Civil Engineering. By the Committee in charge of Division.

The Ideal Engineering Education. By Wm. H. Burr, Professor of Engineering, Harvard College, Cambridge, Mass.

Maximum and Minimum Mathematics Necessary for an Engineer. By Arthur N. Talbot, Professor of Applied Mathematics, University of Illinois, Champaign.

Field Equipment and Field Practice. By Chas. D. Jameson, Professor of Civil Engineering, State University of Iowa, Iowa City.

Shop and Laboratory Equipment. By Dr. R. H. Thurston, Director of Sibley College, Cornell University, Ithaca, N. Y.

Laboratory of Hydraulics at Massachusetts Institute of Technology. By Dwight Porter, Professor of Hydraulic Engineering, Massachusetts Institute of Technology, Boston.

The Use of Engineering Laboratories in the Training of Engineers. By Prof. John Goodman, Yorkshire College, Leeds, Eng.

Practical Laboratory Work. By Thomas Gray, Professor of Engineering, Rose Polytechnic Institute, Terre Haute, Ind.

Original Research by Students. By R. C. Carpenter, Professor of Experimental Engineering, Sibley College, Cornell University, Ithaca, N. Y.; also by Charles D. Marx, Leland Stanford, Jr., University, Palo Alto, Cal.

Method of Training Engineering Students in Technical Literary Work. By Mansfield Merriman, Professor of Civil Engineering, Lehigh University, Bethlehem, Pa.

Methods of Studying Current Technical Literature. By J. B. Johnson, Professor of Civil Engineering, Washington University, St. Louis, Mo.

Drawing for Engineering Students. By Chas. S. Denison, Professor of Drawing, University of Michigan, Ann Arbor.

Number of Hours per Day, Days per Week, and Weeks per Year Required in College Work. General discussion.

Vacation Work. By Alfred Burton, Professor of Topographical Engineering, Massachusetts Institute of Technology, Boston.

Graduation Theses. By Gaetano Lanza, Professor of Applied Mechanics, Massachusetts Institute of Technology, Boston.

Degrees Conferred. General discussion.

Present Favorable and Unfavorable Tendencies in Engineering Education. By Palmer C. Ricketts, Director Rensselaer Polytechnic Institute, Troy, N. Y.

Comparison Between American and European Methods of Engineering Education. By George F. Swain, Professor of Civil Engineering, Massachusetts Institute of Technology, Boston.

Civil Engineering Education. By J. A. L. Waddell, Kansas City, Mo.

Views of Practicing Engineers as to the Methods and Needs of Engineering Education.

Division F, Military Engineering. In charge of Maj. Clifton Comly, Corps of Engineers, U. S. A.

Coast Defense, Including Submarine Mines. By Col. H. L. Abbot, Corps of Engineers, U. S. Army.

Coast Defense. By Maj. Sir G. S. Clarke, K. C. M. G.

Fortifications for Coast Defense, Including Submarine Mines. By J. F. Lewis, Major, R. E.

Controllable Torpedoes Operated from Shore Stations. By Lieut. Col. W. R. King, Corps of Engineers, U. S. Army.

Military Land Mines. By Prof. James Mercier, U. S. Military Academy.

Intrenched Camps. By Lieut. A. M. d'Armit, Corps of Engineers, U. S. Army.

Field Fortifications and Intrenched Camps. By Capt. F. N. Maude, R. E.

Military Surveys and Reconnaissances and Map Duplication in the Field. By Lieut. Henry Jervoy, Corps of Engineers, U. S. Army.

Military Sketching and Maps. By Von Uedom, Colonel and Chief of Division, Royal Prussian Government Survey. Translated by Carl Reichmann, Ninth U. S. Infantry.

Range and Position Finding for Purposes of Gunnery. William Oliver Smith. (Elliott Brothers), London.

Military Railways, Bridges, Locomotives and Rolling Stock. By Capt. C. G. Bate, R. E.

Modern Gun Construction. By James Atkinson Longridge, Member Inst. of Civil Engs., Honorary Member of the North of England Inst. of Mining and Mechanical Engs., Author of "A Treatise on the Application of Wire to the Construction of Ordnance," "Internal Ballistics," "The Artillery of the Future," etc.

Modern Gun Construction and Breech Mechanism. By Capt. Rogers Birnie, Ordnance Dept., U. S. Army.

Modern Gun Construction. By Fleet Engineer George Quick, Royal Navy.

Manufacture of Steel for Modern Guns and Other Ordnance Purposes. By Lieut. Sidney E. Stuart, Ordnance Dept., U. S. Army.

Rapid-Fire Guns. By E. St. J. Greble, Second U. S. Artillery.

The Modern Infantry Rifle. By Cap. S. E. Bl.

Explosives. By Mr. W. R. Quinan, Pinole, Cal.

Explosives. By Capt. Henry Metcalfe, Ordnance Department, U. S. Army.

Explosives. By Lieut. Willoughby Walke, Fifth U. S. Artillery.

Interior Ballistics. By Capt. James M. Ingalls, First U. S. Artillery, with Bibliography of Exterior and Interior Ballistics.

The Transport of Troops and Supplies. By Brig.-Gen. S. B. Holabird, U. S. Army (Retired).

Transportation and Subsistence. By Colonel Olbrecht, Army of Switzerland. Translated by First Lieut. Carl Reichmann, Ninth U. S. Infantry.

Report of Measures Taken for the Sanitary Supervision of the Elbe Basin During the Cholera Epidemic of 1892, in Hamburg. By Dr. Paul Kohlstock, Staff Surgeon for the First District (Berlin). Translated by Maj. E. A. Keeser, Surgeon U. S. Army.

The Sanitary Relations of Military Sites. By Bvt. Lieut. Col. Alfred A. Woodhull, Major Medical Dept., U. S. Army.

Collection and Transmission of Intelligence in the Field. By Lieut. Col. Chas. F. C. Beresford, Royal Engineers.

The Signal Corps of the Army of the United States, with Reference to Its Engineering Development. By Brig.-Gen. A. W. Greely, U. S. Army, Chief Signal Officer.

Some Remarks on Aerial Warfare. J. D. Fullerton, Major Royal Engineers.

Strength of Iron and Steel at High Temperatures. By James E. Howard.

Division G, Marine and Naval Engineering. In charge of Commodore George W. Melville, U. S. Navy.

Rossin's Method of Graphical Integration Applied to Stability Calculations and Bona's Elliptical and Circular Diagrams of Steam Distribution. By Casimiro de Bona, Inspector-General of Engineers, Spanish Navy.

Subject not yet stated. By Archibald Denny, partner in Wm. Denny & Bro.

The Present Position of the Science of Naval Architecture. By Francis Edgar, L. D., Consulting Naval Architect, 113 Cannon St., London, England.

Review of the Rules for Boiler Construction of the Various Governments and Registration Societies. By Nelson Foley, Manager Hawthorn Guppy Co., Naples.

The Tremore at the Time of the Peloponnesian War. By Herr R. Haack, late Technical Director of the Vulcan Shipbuilding Company, at Stettin, Germany.

Forced Draft. Resistance of Ships. By James Howden, Engineer-Designer of the Forced Draft System in Use on the "City of New York" and "City of Paris," and "Teutonic" and "Majestic."

Practical Stability Information. By Arthur R. Liddell.

Relation of Speed and Power in Steam Vessels. By Robert Mansel.

Naval Architecture in the United States. By Benj. Martell, Chief Surveyor of Lloyd's Register.

On the Strength of Ships. By Herr Fred. L. Middendorf, Technical Director of the Germanischer Lloyd.

The Use of Oil at Sea. By W. J. Milner, Secretary Institution of Engineers and Shipbuilders, in Scotland.

Comparison of Machinery for Naval and Mercantile Vessels. By J. T. Milton, Chief Engineer Surveyor of Lloyd's Register.

The Coasting Sailing Vessels of the Adriatic Sea. By Rodolfo Poli, of firm of Poli Brothers, Chioggia, Italy.

The Resistance of Ships. Propelling Instruments. By Prof. W. Richn, Professor at the Imperial Technical High School, Hanover, Germany.

Vibration of Steamers, and His Apparatus (the Pallograph) for Recording Them. By Consul O. Schlick, Agent of Bureau Veritas, at Hamburg.

Diagram of Stability for Any Draught and Stowage. By P. P. Seane, Commandant of Engineers in the Department of Ferrol, Spanish Navy.

Triple Expansion Engines: A Review of Their History and Their Probable Development. By A. E. Seaton, Managing Director Earle's Ship and Engine Building Co.

The Use of Liquid Fuel on the Vessels of the Italian Navy. By Col. Nabor Solian, Corpo del Genio Navale, Italian Navy.

Evaporators and Feedwater Heaters. By Jas. Weir, of firm of G. & J. Weir, Glasgow.

Torpedo Boats. By Carl Ziesse, Manager Schichau Works, which have built the fastest torpedo boats in the world.

The Standardization of Steam Engine Indicators, and the Application of the Results in the Correction of Indicator Diagrams. By S. L. P. Ayres, Chief Engineer, U. S. Navy, and F. H. Conant, Assistant Engineer, U. S. Navy.

Speed Recorders for Ships. By William Cowles, President Cowles Engineering Co.

Steel Castings for Machinery. By Edwin S. Cramp, Superintending Engineer, Wm. Cramp and Sons.

Auxiliary Machinery on War Vessels. By Geo. W. Dickie, Manager Union Iron Works, San Francisco, Cal.

Planning and Equipment of a Modern Ship and Engine-Building Plant. By Prof. W. F. Durand, Professor Marine Engineering and Naval Architecture, Cornell University.

Oils and Lubrication. Chas. M. Everest, Vice-President Vacuum Oil Company.

The Strength of Welded Seams. By Warren E. Hill, Vice-President Continental Iron Works.

Problems Confronting the Designer of Naval Machinery, and the Success Which Has Been Attained in Their Solution. By Ira N. Hollis, Past Assistant Engineer, U. S. Navy, Assistant to Engineer-in-Chief.

Standard Form of Test Piece for Material Used in Connection with Marine Machinery. By Jas. E. Howard, Engineer of Tests, Watertown Arsenal.

The Steam Jacket; Its Genesis; Its Principle of Action, and Its Limitations. By B. F. Isherwood, Chief Engineer, U. S. Navy.

The Steam Shipping of the Great Lakes. By Walter Miller, Superintending Engineer, Globe Iron Works, Cleveland, O.

The New Battle Ships and Cruisers of the United States Navy. By Lewis Nixon, Superintending Naval Architect, Wm. Cramp & Sons, Philadelphia.

Ice Yachts. By Archibald Rogers.

A Standard Steam Engine Indicator and the Necessity Therefore. By David Smith, Chief Engineer, U. S. Navy.

The Government Inspection of Merchant Steamers, and the Influence Thereon of the Rules of the Registration Societies. By E. Platt Stratton, Chief Engineer Surveyor to Record of American and Foreign Shipping.

Light Draft Steamers in Use on the Western Rivers of the United States. By John M. Sweeney.

Valves and Valve Gears for High Speed Engines. By N. P. Towne, Chief Engineer, U. S. Navy, Consulting Engineer to the William Cramp & Sons Ship & Engine Building Co., Philadelphia, Pa.

Tubulous Boilers. By Charles Ward, builder of the tubulous boilers of the U. S. S. "Monterey."

Speed and Revolution Recorder for Measured Mile Trials. By W. D. Weaver, Electrical Engineer, formerly of Engineer Corps, U. S. Navy.

Hydraulic Machinery for War Vessels. By A. A. Wilson, Superintending Engineer, Quintard Iron Works, New York.

Types of Lake Steamers Compared. By J. R. Odham.

The English Channel Bridge.

The proposed bridge across the English Channel has again come up as a subject of discussion in several foreign papers, so that, despite all that has been said about it during the past few years, brief recurrence of it here may not be amiss.

The English company that proposed to undertake the execution of this gigantic project of building a channel bridge for railroad as well as other traffic has, as may be known, completed its preliminary calculations and estimates, according to which the cost of the work would be in the neighborhood of \$160,000,000. It was originally contemplated to carry the bridge on 121 piers, but the number of these was later reduced to 72, giving alternate spans of 400 and 500 meters (about 1,300 and 1,600 ft.), with the bridge arches so high above the water level that even with the highest seas the largest steamers and sailing vessels would be able to pass underneath them with entire safety. As to the terminals of the bridge, it has not yet been decided whether it would be best to have inclined approaches reaching far inland at both ends, or to build hydraulic elevators for lifting railroad cars and other vehicles at once to the upper bridge levels.

The bridge piers are proposed to be built up of steel, on the Eiffel skeleton system, so as to offer the least possible resisting surface to the elements, and to combine the utmost simplicity with the greatest possible safety attainable at the present time. Seven years, it is thought, would suffice for the completion of the work, and of this time four years would be taken up in laying the foundations and building up the piers, while the remaining three years would be devoted to the erection of the superstructure. The bridge would be illuminated electrically, and mammoth signal lights would serve to indicate the openings for vessels to pass through.

Commenting on the proposed bridge in the *Revue des Deux Mondes* a short time ago, M. Fleury reverted to the older tunnel project, maintaining, after a general review of the whole subject, that the tunnel would be by far the preferable means of communication, and that the bridge scheme would, in all probability, come to naught. It is unnecessary, however, to give this part of the subject more than passing attention here. What has been done in the tunnel matter, and the general objections to it form comparatively recent history.

The bridge project seems to have been prompted latterly, in a great measure, by the fact that it would meet with less opposition on the part of England than the tunnel, though it was first suggested quite a number of years ago by Thomé de Gamond, and calculations with reference to it were made at that time. Roughly

speaking, M. Fleury puts the quantity of masonry in the proposed bridge at 4,000,000 tons, and the quantity of structural steel at 1,500,000 tons, and estimates that the cost of the bridge would be four times that of the tunnel, representing a sum of which the expenditure would be wholly unwarranted by the prospective returns. One of the most important objections to the bridge, however, he points out, would be the hindrance and dangers to shipping which it would create, and against which every one interested in whatever degree should and would most emphatically protest.

The Aluminum Works at Neuhausen, Switzerland.

The first works on the European continent for the manufacture of aluminum were established at Neuhausen, in Switzerland, in the year 1887. The company owning and operating the plant was organized a year previously under the name of the Aluminum Industrie Aktien Gesellschaft, and early in 1889 obtained the concession from the Canton of Schaffhausen to take from the river Rhine above the falls at Neuhausen a quantity of water amounting to 20 cu. m., or about 705 cu. ft. per second, for power purposes, this volume, with the head there available, affording something like 4,000 H. P. Until quite recently, however, only about one-half of this power was actually used, and it is only since the extension of the plant a short time ago that the total available energy has been pressed into service. Illustrations and particulars of the enlarged installation are given in two recent issues of the *Schweizerische Bauzeitung*.

According to these, a dam has been built a short distance above the falls at Neuhausen, extending about one-fifth of the distance across the river. From the head race, which is about 500 ft. long, the water is led through two large sheet iron mains, each measuring about eight feet in diameter, for a distance of 200 ft. to the power house, immediately in front of which they discharge through vertical connections into a horizontal distributing main, branching out to the right and left, and from which the several turbines are supplied through independent ducts. Communication between the right and left-hand branches of the distributing main may be cut off if desired, according to the number of turbines that are to be operated. The turbines are nine in number, three of them having formed part of the old plant. Two of these are of 600 H. P. each, working at 150 revolutions per minute, while the third runs at a speed of 250 revolutions per minute and is rated at 300 H. P. The new turbines are rated at 610 H. P. each, and, like the old ones, are all of the Jonval type. They run at 150 revolutions per minute and have a mean diameter of 1,620 mm., or about 65 in. The pressure of the water on wheels of such comparatively large diameter, added to the weight of the wheels themselves and of the transmission shaft and dynamo armatures to which they are coupled, would have called for expensive balancing apparatus, and the plan was accordingly followed of admitting the water from below. With this arrangement no balancing contrivance is required, at least not when working at the normal rate of speed. Still it was thought advisable to provide means for partially counter-balancing the weight of the running parts so as to admit of satisfactorily operating the wheels at lower speeds when required and suitable measures were taken to this end, the balancing devices adopted being so arranged that they can be brought into action or cut out as thought best. The dynamos to which the turbines are coupled are multipolar machines, each having 24 poles, and the brush-holders are controlled by means of worm gearing admitting of fine adjustment and tending to prevent sparking. Each turbine is coupled direct to the dynamos and each dynamo has 120 brushes and corresponding brush-holders. From these the current is led off by massive copper cables to the electric smelting furnaces. The daily output of pure aluminum amounts to 2,500 kilogrammes, or about 5,500 lbs.

The turbine plant was furnished by Escher, Wyss & Co., while the electrical outfit came from the Oerlikon Machine Works, both well known Swiss establishments.

TECHNICAL.

Manufacturing and Business.

W. S. Rogers, for four years Superintendent for M. C. Hammett, of Troy, manufacturer of the Richardson balance slide valves, has been appointed General Manager of the Troy Valve Co.

The Toledo Nut Lock Co., of Toledo, O., has been granted a charter, and will engage in the manufacture of nut locks and other mechanical devices. The capital stock is \$100,000.

The entire plant of the National Tube Works Co., at McKeesport, Pa., which has been idle for several weeks undergoing repairs, has again resumed operations with the exception of the puddling and muck mill departments.

The Ohio Falls Car Mfg. Co. has declared a dividend of 12 per cent. on the common stock out of the net earnings of the company for the year ending June 30.

The Carnegie Steel Co. Ltd., of Pittsburgh, has placed

an order with the Yale & Towne Mfg. Co., of Stamford, Conn., for eleven 10-ton three-motor electric traveling cranes. These cranes are to be used at the Homestead Steel Works in taking beams from the cooling tables and distributing and loading them on cars ready for shipment. The cranes will all be used out of doors, unprotected from the weather.

The Brooks Locomotive Works has nearly completed a brick riveting tower 70 ft. high and 26x30 ft. on the ground. In it will be used a Bennett hydraulic riveter with a 17-ft. stake, which will permit of the riveting of the boilers after they are put together. Two of the hydraulic riveters have been in use in the works heretofore, with a 6-ft. stake.

The Sterling Company, of New York City, manufacturer of water-tube boilers, has recently received orders from the Cleveland Cable Railroad Co., Lehigh Valley Traction Co. and Elmira Knitting Mills. It is also installing a large plant for the Union Passenger Railroad Co., New York City, and for the Lindell Avenue road, St. Louis.

A charter has been issued by the Canadian Government to the Trojan Coupler Co. (Limited) with an authorized capital of \$300,000, with headquarters in Montreal. The provisional Directors are A. H. Renshaw, Troy, N. Y.; George Hall, Ogdensburg, N. Y.; George G. Foster, William Stewart and Farquhar Robertson, the last three of Montreal.

E. J. Gaynor, the railroad contractor of Pottsville, Pa., has made an assignment to Attorney Nicholas Hebliek, without preference. He has done considerable work for the Pennsylvania, Norfolk & Western and Lehigh Valley, and at present is engaged on the latter road near Bernice. Judgments amounting to nearly \$50,000 have been entered. Losses from low bidding and general business reverses caused the failure.

Foreign orders for woodworking machinery are still coming in to J. A. Fay & Egan Co., of Cincinnati, O., with welcome frequency, apparently unaffected by the financial depression. A few days ago this concern received orders for machinery to equip a planing mill and a woodworking factory in Russia. Orders for outfits of this description are not uncommon with this establishment. This shipment will go via the Mediterranean Sea to Constantinople, thence via Black Sea to Sebastopol, and then by rail northward some two hundred miles to Bielgorod, a city of 40,000 people.

The National Switch & Signal Co. has ordered work on the new buildings at Odenweldertown, near Easton, Pa., stopped temporarily on account of the reorganization of the company.

Iron and Steel.

Mr. John C. Paul, who was last week appointed Receiver of American Steel Wheel Co., has also been appointed Receiver of the Garwood Steel Works, which has works at Garwood, N. J., the location of the factory of the American Steel Wheel Company.

Pittsburgh steel mills have received orders recently for no less than 20,000 tons of steel rails from roads in the Northwest, according to a statement in a local paper.

New Stations and Shops.

The Delaware & Hudson Canal Co. has purchased a site for a new station at Scranton, Pa., and plans for the new building are now being completed.

The Dunkirk, Allegheny Valley & Pittsburgh is to erect a new passenger station and a freight house at Warren, Pa. A new freight yard will also be laid out at that town.

The St. Clairsville & Northern is building a new station at St. Clairsville, O., to take the place of the one recently destroyed by fire. The new station will cost about \$5,000.

The Norfolk & Western is building a new station at Eckman, W. Va., on the Ohio River extension.

The tenders for the Front street side of the new Union Station at Toronto, Ont., have been opened and considered by the Grand Trunk authorities, but have not been accepted. Mr. Seargeant, the General Manager, states that the company, after calling for the tenders, thought it necessary to make certain changes in the specifications. In consequence of this it has been decided to call for new tenders under the altered specifications.

The new Union Station at Terre Haute, Ind., will be opened to the public on Aug. 15. The new station will be used by the Vandalia Line and the other roads which run trains into Terre Haute, except the "Big Four" road.

Transportation in Vienna.

A very comprehensive paper on the present as well as the proposed transportation facilities of Vienna, and the improvement of the River Danube and the Danube Canal, was recently presented before the Austrian Engineers' and Architects' Society by Mr. Anton Waldvogel, and is published in full in the *Zeitschrift* of that Society of June 9 and June 16. More than twenty years ago Mr. Waldvogel read his first paper on the subject, and since that time has conscientiously followed up the study of the problem, so that, as might have been expected, his latest contribution is exceptionally thorough. The various street car lines, both existing and projected

for which, by the way, Mr. Waldvogel most emphatically recommends electric traction, and the different railroad stations are treated of at considerable length, diagrams of some of the stations of London and Vienna being given for purposes of comparison, and plans and profiles of the lines of road, and several maps of the city of Vienna being added. The improvement of the Danube Canal, with which the sewerage question is intimately associated, the building of docks and piers along its line as well as that of the Danube proper, and the location of several new bridges over the river, are treated of in the second of the two divisions making up the paper, the whole forming a pretty complete review of what has already been done, and of what, in the opinion of the author, yet remains to be done, in order to provide transportation facilities, by rail, as well as by water, which shall satisfactorily meet both the present and prospective requirements of the Austrian metropolis. The two maps of the city which accompany the paper show by different colors the location of old, new and projected lines of railroad, piers and locks in the Danube Canal, and other features of corresponding importance.

Cooking by Electricity.

The New England Electric Heating Company, of Boston, Mass., has developed a method of cooking by the use of the electric current, and is considering the application of this system to dining cars. The company has established in Boston an experimental kitchen—a very compact arrangement, with a closet for dishes and cooking utensils on the wall, beneath it a switchboard, under which is a dresser which takes the place of a range. The utensils on this are connected by wires with the switchboard; and the necessary heat for making coffee, frying, the uses of a chafing dish, etc., is supplied. Beside this stands an oven and on the top of it a boiler, and beside this a hot water tank. All of the operations of cooking are carried on with perfect success by the use of the electric current. The advantages of such apparatus in a dining car are apparent; they are safety, economy of space, absence of fumes and steam, and almost entire absence of heat from the kitchen.

Heavy, High Carbon Rails.

Mr. P. H. Dudley has just had rolled 5,000 tons of 95 lb. rails for the Boston & Albany on the section designed, by him and already shown by us. This last order was rolled at the Scranton Iron Co.'s mill, at Scranton, Pa. The rails are 60 carbon, on specifications prepared by Mr. Dudley in 1890. The product secured, like that of the Bethlehem mill heretofore described, is a very tough and hard steel. There are now over 150,000 tons of high carbon rails in the track made on these specifications. When this order for 5,000 tons is laid, the Boston & Albany will have in its track nearly 27,000 tons of the new high carbon 95 lb. rails.

Anthracite Coal Allotments.

The percentages of outputs of the various coal producing companies have been published. They are as follows:

	Percentage allotted.	Percentage shipped.
Philadelphia & Reading	21.63	18.25
Lehigh Valley	18.97	16.12
Central of New Jersey	15.98	12.50
Delaware, Lackawanna & Western	15.54	16.20
Delaware & Hudson	10.65	10.02
Pennsylvania Railroad	10.45	13.50
Pennsylvania Coal	4.84	4.45
New York, Lake Erie & Western	4.91	3.40
Delaware, Lehigh & Schuylkill (Coxe)		3.00

The Chicago & St. Louis Electric Railroad.

The Chicago & St. Louis Electric Railroad Company says that progress is being made and that the work has been steadily going forward since ground was broken, last October. It reports that arrangements for placing bonds were completed and that the outlook was flattering when the present financial trouble stopped further negotiations. The company announces that it is out of debt and will continue to pay its bills for two years at least and maintain the present rate of progress. With the enterprise in this condition it hopes for better times, and its projectors are very sanguine that the road will be completed, and that as a means of travel it will be in advance of the world.

Dredging Mersey Bar.

Dredging operations for deepening the channel on the Mersey bar, entering the port at Liverpool, were begun in September, 1890, when a 500-ton steam hopper barge, with centrifugal pumps, was put at work. The least depth was 11 ft. on the seaward side and 15 ft. on the Mersey side, obstructing navigation for a thousand yards in length and width. A stormy autumn interfered with operations and heavy gales from the northwest obliterated three months' work of the dredger. In 1891 another dredger was set to work and the two worked the rest of that year. It was estimated that the removal of 800,000 tons of material would increase the depth by 6 ft. 6 in., giving a least depth of 17 ft. During that year a gain of 5 ft. had been obtained at an expenditure of about £15,000, no less than 657,000 tons of sand having been removed. In May, 1892, a contract was made with the Naval Construction & Armament Company of Barrow for a twin-screw dredger, capable of carrying 3,000 tons of sand, with a pump capacity to fill her in 45 minutes. This vessel, the "Brancher," was launched last March and

is now at work. Her dimensions are: Length between perpendiculars, 320 ft.; molded depth, 20 ft. 6 in.; beam, 40 ft. 10 in. She is built of steel, and has a gross register of 2,560 tons. There are eight hoppers fitted with the Lyster hydraulic apparatus. A well in the middle of the vessel permits the working of a suction tube, 3 ft. 9 in. in diameter, which can work to a depth of 45 ft. Two centrifugal pumps, with pipes 3 ft. in diameter, driven by triple expansion engines with cylinders 11½ in., 18 in. and 29 in. diameter, by 18-in. stroke, and working at 160 lbs. steam pressure, complete the sand raising apparatus.

The first two dredgers removed a total of over 1,000,000 tons of sand. It is believed from the results of operations, so far, that continual dredging will have to be carried on to maintain the requisite depth of channel, although, with the increased depth, there may be sufficient scour to maintain the channel without dredging. For these particulars we are indebted to *The Engineer*.

Tests of Materials.

The fourth international conference on uniform methods of testing structural materials, held in Vienna a short time ago, was attended by 125 representatives from different countries. The several sessions were presided over by Professor Bauschinger and extended over two days, most of the time being devoted to discussions pertaining to hydraulic cements. The next conference will be held at Zürich, Switzerland, in September, 1895.

An Offer to Maintain Draw-Bar Attachments.

The Butler Draw-Bar Attachment Co. has issued an announcement that, as an evidence of good faith in the attachment, cannot be impeached. The best proof of a man's confidence in his device is when he insures its success, by an offer to maintain it in service and be responsible for its failure. This the Butler company is prepared to do. In view of the unfavorable reports in the discussion, at the recent M. C. B. Convention, of the failure of drawbars, the Butler Co. proposes to relieve railroad companies of the anxiety and delay and cost to which they have been subject. The company offers to enter into contracts with any railroad or car company to maintain its attachment for \$1 a year. This is undertaken on the reports of numerous customers who report the total cost of repairs to these draw-bar attachments as not exceeding five per cent. of their cost. The offer is not made upon the reports of service on a few cars, but is based upon experience with railroad and car companies using the device representing 28,000 miles of road and 265,000 cars. The company admits having put out some parts that were too light and did not stand the service, but these have been recalled and replaced with new and stronger parts.

THE SCRAP HEAP.

Notes.

The tunnel of the Louisville & Nashville, at Big Stone Gap, Va., caved in July 21, and it was expected that the work of clearing it would require a week's time.

The police officers of the New York Central at Poughkeepsie arrested 17 men who were stealing rides last Sunday and had them imprisoned. At Johnstown, Pa., 12 car thieves were arrested on Monday.

The New Orleans & Northwestern and the Mississippi Valley line of the Illinois Central have just resumed traffic after about five weeks' suspension in consequence of the overflowing of the Mississippi River.

A dispatch from Boone, Ia., reports that 150 Colorado miners traveling eastward, without money or food were fed by the city authorities there the other day. It appears that they rode on a freight train and the railroad company did not object.

The conductor and the engineer of a St. Paul & Duluth passenger train were arrested last week for not stopping at Pine City, which is a small place, but is the county seat of Pine County. A recent law of Minnesota requires trains to stop at all county seats.

The Wagner Palace Car Co.'s shops at East Buffalo are now running very light, the pay roll amounting to only about \$30,000 a month, as compared with \$90,000 not long ago. The Southern Pacific is reducing expenses at its principal shops in California.

The annual report of Superintendent R. C. Jackson, of the Second Division of the Railway Mail Service, shows that the increase in the number of pieces handled over the previous year is 6.3 per cent. The record of errors has been reduced from 101,000 to 82,801.

The Pennsylvania has issued a circular to its employees regarding the special trains to carry them to the World's Fair, giving the dates for seven excursions between now and Sept. 9. Each date is assigned to a specific division or territory. The Louisville & Nashville is to run special trains for its employees going to the World's Fair, giving them about ten days' leave of absence.

The Pennsylvania has lately had long-distance telephone apparatus put into the office of its principal officer at New York, Jersey City, Philadelphia, Wilmington, Baltimore, Washington, Harrisburg, Altoona, Pittsburgh and Chicago. It has been reported in the newspapers that the telephone was to supersede the

telegraph in the handling of train orders and other ordinary railroad business on this company's lines, but the foregoing seems to be the only basis for this story.

Frauds by railroad employees upon their employers were reported last week on the New York & New England, the Atchison, Topeka & Santa Fe, and the Cincinnati, New Orleans & Texas Pacific. On the first-named road 21 men were arrested at East Hartford, Conn. By a conspiracy the pay rolls had been made out for a larger number of days than had actually been worked. On the Atchison it is claimed that similar frauds have been discovered on several divisions of the road east of Topeka, fictitious names having been placed upon the rolls. The reports as published seem to be somewhat exaggerated, but not without a considerable basis of truth.

Not all the fast time records are made by large, new engines. A Buffalo paper reports that Engineer Sylvester, of the Lehigh Valley, recently ran 88 miles in 88 minutes, much of the way over an ascending grade, with an engine carrying only 135 lbs. of steam and hauling five cars. The engine is No. 652, and weighs 45 tons. Its cylinders are 20 in. x 22 in., and the driving wheels are 5 ft. 10 in. in diameter. On the Fremont, Elkhorn & Missouri Valley, on the 15th, a special train ran 214 miles in 4¼ hours. The Keystone express of the Pennsylvania road, on July 23, ran from Altoona to Harrisburg, 132 miles, in 145 minutes. The train weighed about 500 tons. The grade on this division is much of the way descending, but there are, nevertheless, many hard places.

The Kansas Board of Railroad Commissioners has published its valuation of railroads as follows: Atchison, Topeka & Santa Fe, \$24,022,364; Union Pacific, \$8,518,738; Chicago, Rock Island & Pacific, \$7,341,906; Missouri Pacific, \$12,492,495; Missouri, Kansas & Texas, \$2,499,738; Kansas City, Fort Scott & Memphis, \$2,916,078; St. Joseph & Grand Island, \$1,442,179; Burlington & Missouri River, \$1,469,291; branch lines, all roads, \$1,381,561; total valuation for 1893, \$61,948,442; total valuation for 1892, \$51,404,543; total increase for 1893, \$10,579,899. The average increase is about 21 per cent. The roads are presenting petitions to the board, and in the cases of the Rock Island and the Missouri Pacific substantial reductions have been made.

Among the numerous press dispatches telling of reductions of wages and discharges of railroad employees it is pleasant to notice one item of an opposite character; the passenger conductors, baggagemen and brakemen on some divisions of the Old Colony have had their pay increased about 10 per cent. This change is doubtless due to the absorption of the Old Colony by the New York, New Haven & Hartford, and is presumably made for the purpose of equalizing rates throughout the system. Among the latest reports of reductions in expenses are those referring to the shops of the Chicago, Milwaukee & St. Paul, where the pay-rolls are to be reduced 20 per cent. A dispatch from Aurora states that the Chicago, Burlington & Quincy is discharging men at the shops and also in the transportation department. The Train Dispatcher's office at Fulton is abolished and the work assigned to the Aurora office.

The Illinois Railroad Commissioners have issued an order limiting the speed of all trains on the Indiana & Illinois Southern, the condition of the road having been complained of by "The Traveling Men's Association." Messrs. Richard P. Morgan & Son, Consulting Engineers, by order of the commissioners, made a thorough examination of the physical condition of the road from Effingham to the state line. Their report shows that, while important improvements were made in 1887 and 1889, the improvements were not such as to adapt the road to the heavy traffic brought upon it by widening the gauge. The condition, with the exception of the bridges, is at a very low standard. The financial condition is such as to be insufficient to furnish a basis for any form of additional loan, and the ability of the company to make improvements is correspondingly limited. Officers of the company acknowledge the reasonableness of the complaint filed against the road. The Consulting Engineers concluded that there was no feasible remedy for the evils complained of but to reduce the speed of all freight and passenger trains until the road shall be so improved as to justify a higher rate of speed.

World's Fair Notes.

It has for some time been charged that many passes and badges entitling the bearer to admission have been improperly used, and the Council of Administration, at a meeting held on the 20th, passed resolutions directing that Superintendent Tucker, of the Department of Admissions, be instructed to direct all persons holding passes or badges to present the same to him on or before Aug. 1 for examination, and if on such examination he finds the holder entitled to admission, he shall countersign them, stating the time for which the pass shall be good.

A number of the California State Commissioners have for the past few weeks been making estimates on the cost and probable success of a midwinter fair, which they now propose to hold in Golden Gate Park, San Francisco, during the coming winter. It is expected that this will be a faithful reproduction, upon a considerably reduced scale, of the Columbian Exposition. The nature of the Exposition will, of course, necessitate a heavy outlay for landscape gardening, construction of lagoons, caves, terraces and other features, which are to be given to the park when the fair is over. According to the present plans there will be four main buildings to be erected from subscriptions they are now receiving. All of the coast and a number of the Southern

States will be invited to participate in the event. The estimated cost of the proposed buildings is \$535,000, with an additional \$300,000 for grading and running expenses for the four months. It is expected that some of the present attractions on Midway Plaisance will be represented.

In consequence of the opposition of the French Commissions to the system of awards which has been adopted, all French exhibits have been withdrawn from the competitions, and the members selected by the French Government to act on the Bureau of Awards have received official notice from President Carnot that their authority has been changed from that of Jurymen to recorders, and that it will be their duty to make an examination of the exhibits of all countries as well as those of France and write reports of the result of their labors, to be filed with the Government for comparison. On his return home each man will be required to write a complete report of his impressions of the Exposition, showing what advancements have been made, in his opinion, in every branch of industry since the Paris Exposition. It has been the desire of French exhibitors to compete, but under the system of awards adopted they almost unanimously decline to enter into any contest or to allow their exhibits to be passed upon.

Foreign Notes.

Concerning the already much-talked-of electric elevated railroads at Berlin, Germany, it is of interest to note that the franchise for the building of at least one section of these lines has finally been awarded to Messrs. Siemens & Halske. Nothing, however, is said as to when the work of construction is to be commenced.

Work on the projected railroad to connect Salonica and Dedeagatch, in Turkey, is shortly to be commenced, proposals for the construction of the first hundred kilometers having already been received. The total length of the line will be about 500 kilometers, or about 310 miles, and contracts for the balance of the work will be given out some time before the end of next October.

According to a correspondent of a German paper, Asia Minor would seem a promising field for builders of ice-making and refrigerating machinery. At Smyrna, Constantinople and Alexandria ice is already made by large machines, and one of these is said to be now in use in Jerusalem also and to have stimulated inquiry for others. In nearly all the towns of Asia Minor cooling apparatus of the most primitive kind only is employed, notwithstanding the fact that there is a constant and great demand for ice, which, it is argued, would make modern ice-making plants in those places pronounced successes.

A metallic paving is shortly to be put to practical test in two of the streets of Paris—the Boulevard Sébastopol and the Rue Saint Antoine—the intention being to put down two lengths of about 100 ft. each between the street car tracks. The paving to be tried is of Swiss origin, and is to be laid at the expense of the inventor, who has also substantially guaranteed the relaying of the original pavement in case that to be tested should prove unsatisfactory. The trial stretches selected are in streets having stone and wood pavements. Incidentally it may be said that as metallic pavements of several kinds have been repeatedly under trial in different cities in the past, it may be questioned whether the proposed experiment will lead to any new conclusions.

Concerning the question of magnetization of steel rails M. Vinot, a French engineer, has contributed the results of some experiments to the *Industrie Electrique*. M. Vinot took for his experiments a portion of the line of the Compagnie du Midi between Bordeaux and Cette, the left-hand track serving for the trains coming from the latter town, while on the right-hand track the trains run in the opposite direction. On the experimental section chosen the rails were laid in a direction perpendicular to the magnetic meridian, or, in other words, from west to east, and it was found that when a pocket-compass was placed on one of the joints of one of the lines of rails of the left-hand track, the needle pointed exactly in the direction of the line of rails, the north pole being turned toward the town of Cette. With the same compass similarly placed on the right-hand track the needle again pointed in the direction of the line of the rails, but the north pole this time was turned toward Bordeaux. The distances between the rail ends varied from about one-tenth to half an inch, producing a very perceptible shock on the passage of trains due to the respective depressions and elevations of the ends of the rails and their influence on the car wheels, and these shocks, it was concluded, developed a south polarity in those rail ends in which the concussion took place.

South American Notes.

The report of the Lima Railways Co. for 1892 shows net earnings of \$64,897 as against \$74,250 for 1891. The traffic decreased 11.69 per cent., but the working expenses were reduced 12.77 per cent., in spite of an increase of over 10 per cent. of train-miles run.

Señor Michelena has been deputed by the Venezuelan Government to treat directly with England for the settlement of the long-pending Venezuelan boundary dispute, and it is reported that his advances have been cordially received by the Foreign Office. It is expected that this will give fresh encouragement to the enterprise for building a railroad from the Orinoco to the famous Yuruari gold mining region.

It is reported from Ecuador that another railroad is projected in that republic which bids fair to be undertaken without delay. A wealthy Ecuadorian, Don Emilio Ruperti, has secured the concession for a line from Santana to the port of Manta, which lies a little south of midway between Guayaquil and Pailon. The region to be traversed is high and well drained, and the difficulties of construction will be small. The estimated cost is \$3,000,000. The district to be served is fertile, and the exports from Santana alone, consisting largely of ivory nuts, amount to over 5,000 tons per annum, which are now brought out on mule back.

The Trans-Andine Railroad was first projected in the year 1864, by Mr. John E. Clark. A concession was not secured, however, until 1872, when the Argentine Congress authorized its construction, limiting the cost to \$33,000 per kilometer, upon which sum a seven per cent. guarantee was granted, to run 20 years from the opening of the line to traffic.

Out of 152 now 44 miles remain to be constructed. The tunnels are 20 in number, aggregating a little more than 10 miles. The longest of these, known as Cumbre, will measure 3.14 miles. So far only one and a half miles have been pierced on the Argentine side, and a trifle over a half a mile on the Chilean section. It is estimated that to finish the tunnels 200,000 cubic meters of rock remain to be excavated. Construction was continued throughout the financial troubles in Argentina, but has now been temporarily suspended.

Lake Notes.

Shipments of freight of all kinds through the St. Mary's Falls Canal from the opening this season to July 1 aggregated 2,558,078 net tons as against 3,463,924 net tons on the same date last year. This shortage of 904,846 net tons, or about 26 per cent., is chargeable in part to the late opening of navigation. Over 43 per cent. of the shortage is on coal and iron ore.

The total movement of coal and ore to July 1 of both years is shown in the following table:

	Coal up, net tons.	Ore down, net tons.
July 1, 1892.....	1,015,783	1,323,791
July 1, 1893.....	883,189	1,091,466
Shortage.....	132,599	232,325

A great deal of a coal shortage is in soft coal, or the fuel of the railroads and larger manufacturing concerns.

Freights are very low. charters are reported at 50 cents per ton from Marquette to Cleveland and 40 cents from Escanaba to Cleveland. This last rate leaves the vessel 19 cents per ton after deducting trimming and unloading. On the 11th inst. boats were offered at Duluth at 1 cent per bushel for wheat to Buffalo, but were not taken. Under these circumstances many of the vessel owners have laid their boats up and a general reduction of wages to the extent of about 20 per cent. has been determined on. It is reported from Ishpeming that 6,000 men have been discharged from iron mines in the Lake Superior district since April 1, and that some 500 English miners have returned to their homes in Cornwall, Cumberland and Lancashire.

New Coal Docks at Sandusky.

Work on the coal docks of the Sandusky & Columbus Short line at Sandusky Bay, O., is progressing, but the docks will not be ready for coal shipments as soon as expected, because the contractors report striking large beds of stone in the channel they are cutting from the government channel, when they had no reason to expect it at the beginning of the contract.

Kanawha Valley Coal Shipments.

The following figures from the annual report of Resident Engineer Scott, in charge of the Kanawha River improvement, which has been in progress since 1881, concerning the shipments of coal from the section below the falls of the river by river and rail, are of interest, showing as they do the growth of the demand for coal from that region, and being the basis upon which the Chesapeake & Ohio and Kanawha & Michigan companies are making their extensive improvements, and several other roads are being brought into existence. In 1881, the shipments by rail were 6,631,660; by river, 9,628,606; 1883, by river, 15,370,458; by rail, 13,290,255; 1884, by river, 18,421,048; by rail, 12,072,159; 1885, by river, 17,812,323; by rail, 12,972,217; 1886, by river, 17,861,613; by rail, 13,063,745; 1887, by river, 23,233,374; by rail, 19,100,896; 1888, by river, 20,100,525; by rail, 20,982,688; 1889, by river, 26,921,783; by rail, 22,031,121; 1890, by river, 24,161,554; by rail, 27,443,425; 1891, by river, 25,761,346; by rail, 28,668,025; 1892, by river, 26,787,788; by rail, 30,844,100. This not only shows a decided increase of shipments by both river and rail, but it shows that the railroad shipments have overtaken and passed the river shipments by over four million bushels last year. This is true, too, in the face of the fact that the United States Government has spent \$3,885,200 upon the improvement of the Kanawha River.

Pig Iron Production.

Mr. Swank gathered the statistics of our output of pig iron for the first half of this year in time to publish them in the *Bulletin of the American Iron and Steel Association* for July 19. As the statistics include the products of states so far apart as Massachusetts, Texas and Washington both Mr. Swank and the business community are to be congratulated on the promptness with which the returns are gathered and given to the public. Mr. Swank puts the total production of pig iron in the United States for the first half of 1893 as 4,532,918 tons. This is 19,790 tons less than either of the estimates published in the *Railroad Gazette* of the 21st inst., or in other words the estimate was within less than half of one per cent.

An abbreviation of Mr. Swank's tables of production is given below:

	First half of 1892.	Second half of 1892.	First half of 1893.
Totals.....	4,769,683	4,387,317	4,562,918
Anthracite.....	931,699	865,414	855,234
Charcoal.....	279,915	257,706	237,240
Bituminous.....	3,558,769	3,264,197	3,470,444

The production of Bessemer pig for the three half years was as below:

	2,254,345	2,189,696	2,374,890,
or this half year our make of Bessemer pig was more than half of the aggregate production.			

Calling attention to the fact that for the first half of this year the production was greater than in the prosperous last half of 1892, Mr. Swank predicts that the total make for this year will aggregate much less than in last year.

The stocks of unsold pig iron are given as below:

	Jan. 30, 1892.	Sept. 30, 1892.	Dec. 31, 1892.	Jan. 30, 1893.
Total.....	737,946	716,382	506,116	549,141
Anthracite.....	173,935	133,120	119,015	120,461
Charcoal.....	218,812	193,753	173,156	184,536
Bituminous.....	345,199	290,509	213,915	244,144

In other words, of the 175,601 tons in excess of the make of the last half of 1892 only 20,529 tons or 11.6 per cent. was not absorbed by the market at the prices which were obtained.

Austrian Railroads.

From a statistical account of Austria's railroads in 1891, given in a recent issue of the *Austrian Eisenbahn-Zeitung*, it appears that the total length of lines in that country at the end of the year amounted to 15,621 kilometers, or about 9,700 miles. The equipment comprised 3,906 locomotives, 8,039 passenger cars, 91,410 freight cars, with a combined carrying capacity of 970,223 tons, and 470 mail cars. The number of passengers carried during the year was 84,956,961, and the quantity of freight figured up 84,537,334 tons. Twenty-one and a half per cent. of the gross receipts of the various lines were due to the passenger, and the remainder to the freight traffic. In the matter of operating expenditures and receipts, it appears that the former had risen from 45.36 per cent. in 1890 to 47.98 per cent. in 1891, leaving, therefore, a somewhat smaller profit for the latter year.

The Railroad and the Tiger.

The Pennsylvania Railroad Company has had an attachment served upon Charles A. Eldon, taxidermist, of Williamsport, to restrain him from delivering to L. D. Parker the mounted black tiger, killed a short time after the wreck of Main's circus near Tyrone. The company says the proprietor of the circus has been paid in full, and that the property of the wrecked circus belongs to the road.

The Trans-Caspian Railroad.

This road, which was opened in May, 1888, doubtless as a military measure, is already proving not only a civilizing force among the Turcomans, but a certain important factor in the world's supply of cotton. A British consular report from Batoum states that last year 72,565 tons of raw cotton which had been grown on the line of this railroad was brought to the shores of the Caspian Sea. The cotton was sent to mills at Lodz, Warsaw and the Moscow districts. It is cheaper than either American or Egyptian cotton and the Russians expect that the Trans-Caspian provinces will supply all the cotton required by Russian mills in the course of a few years. The 72,565 tons of cotton must have left between \$8,000,000 and \$10,000,000 somewhere on the 900 miles of railroad built by General Annenkoff, an improvement on the old industry of capturing Persians and selling them for slaves.

A Railroad Between Beirut and Damascus.

In a recent article on the railroads of Asiatic Turkey, *Les Annales des Travaux Publics*, after briefly outlining the Jaffa-Jerusalem road, to which repeated reference has already been made in the *Railroad Gazette*, says that one other line of which the construction will, no doubt, be soon undertaken is that between Beirut and Damascus, the former being, as is well known, one of the most prosperous cities of the East, having about 120,000 inhabitants, while the latter is even larger, having over 200,000 inhabitants, and is scarcely less important in a commercial way. Beirut, being situated on the coast, is in direct communication by water with the principal Mediterranean ports, and its harbor works have already, in part, undergone an extensive reconstruction, long lines of docks and breakwaters having been built, so that even the largest vessels have no difficulty in finding good anchoring ground. Damascus, on the other hand, has long been famous for its manufactures and has been, almost from times immemorial, the centre of the caravan trade with the far East. The distance between the two cities can, at present, not be covered in much less than about 12 hours, and railroad communication would be of vast benefit to them both. The length of line to be built would be about 84 miles.

Rails for Siberia.

An expedition is said to have been started out by the Russian government to take two light draft steamers into the Yenisei by way of the Kara Sea. These steamers have been built in England and will be taken out about the end of July by the vessels "Blencathra" and "Orestes." The latter vessel will also take as part of her cargo a shipment of rails for the Trans-Siberian railroad. These will be transferred to the river steamers when they are launched and so taken south to the line of the railroad. It is expected that the "Blencathra" and "Orestes" will get back to England about the middle of October.

British Shipbuilding.

The shipbuilding industry of the United Kingdom shows but little sign of improvement. Lloyd's return for the past quarter gives the following particulars of vessels under construction at the end of June, and the corresponding figures for 1892 are added for comparison:

Description.	June 30, 1893.		June 30, 1892.	
	No.	Gross tonnage.	No.	Gross tonnage.
Steam—				
Steel.....	230	511,596	281	616,223
Iron.....	25	3,702	40	13,794
Wood and composite	7	493	7	1,205
Total.....	262	515,791	328	631,222
Sail—				
Steel.....	56	89,821	84	140,344
Iron.....	1	225	5	3,662
Wood and composite.	35	3,283	30	3,234
Total.....	92	93,329	119	147,240
Total steam and sail.	352	609,120	447	778,462

The present figures are less than those for the previous quarter by about 12,000 tons. This decrease occurs entirely in the steam tonnage, the sailing tonnage having slightly risen. A comparison of the quarter just ended with the most recent periods of extreme activity and extreme depression will serve to indicate more clearly the actual position of the shipbuilding industry. The highest level of late years was reached in June, 1890, when 455 steamers of 842,357 tons and 81 sailing vessels of 87,254 tons (total, 536 vessels of 929,611 tons) were under construction in the United Kingdom. It will be seen that these figures exceed the present returns by 52 per cent. on the total tonnage, and by 63 per cent. on the steam tonnage, the sailing tonnage being at practically the same level. On the other hand, the period at which the smallest amount of work was in progress occurred about September, 1886, when 170 steamers, of 286,071 tons, and 86 sailing vessels, of 63,049 tons (total, 256 vessels, of 349,120 tons), were, under construction.—*The Economist*.

The Pasadena & Mt. Wilson Railroad.

The final opening of this road took place on June 29, with the usual ceremonies incident to such an event. As yet but little has been published outside of Southern California of this departure in railroad building. It possesses the distinction of being the third mountain railroad in the United States, and in addition possesses the further feature of being provided with the steepest grade yet constructed in America. The rack roads of Mt. Washington in New Hampshire and Pike's Peak in Colorado are provided with heavy grades, but the 60 per cent. grade of this road up the Sierra Madre is unequalled. After careful consideration this tremendous incline was constructed for cable operation instead of by the employment of the rack rail. The road as a whole now consists of three classes of construction. An electric easy grade road from the terminus of the Altedena Division of the Los Angeles Terminal Railroad skirting the foot-

hills and thence into Rubio Canon to the foot of the cable incline. Here passengers take the curiously inclined cable cars, and proceed directly up the mountain side to the summit of Echo Mountain. Once on this height they can take the upper electric division and by a well graded route proceed to the final summit of Mt. Wilson. The upper electric road is not yet in operation; the grading is, however, being pushed and tracklaying will probably be soon completed. But the lower electric section and the great cable incline are in regular operation, and work with admirable precision and safety. On July 4 over 3,000 people taxed the system to its utmost, after such a recent beginning, yet all worked well and without a mishap.

LOCOMOTIVE BUILDING.

A new compound, six-wheeled, passenger locomotive, has been turned out of the New York, Lake Erie & Western shops at Susquehanna, Pa.

Seven of the improved class "P" passenger engines have been turned out of the Altoona shops of the Pennsylvania, and after a test on the eastern slope of the Alleghenies have been put in regular service.

CAR BUILDING.

The Mexican National is in the market for 400 box cars.

Work will be resumed shortly at the Carlisle Car Works, a number of small orders for cars being received.

The North Carolina Car Co., of Raleigh, N. C., is filling an order from the Seaboard Air Line for a number of cars, both box and caboose.

The Gulf, Beaumont & Kansas City road, a new Texas line, has placed its first order for equipment, including 20 platform cars, 10 box cars, both with 60,000-lbs. capacity, two cabooses and two passenger cars.

The Pennsylvania Railroad car shops at Altoona have for some time past been building new passenger cars for service on the Columbian and Keystone expresses and other fast trains. They differ from the ordinary Pennsylvania passenger car in that they are vestibuled, are elaborately fitted up with mirrors, laboratories and have unusually fine upholstery. They are 60.11 ft. long and weigh about 82,000 lbs. Ten of these coaches are already built, some of them being in service. One solid train is now running between Philadelphia and New York. In addition the company has also had built three combination cars, part baggage and part passenger, for these trains. They are vestibuled on the passenger end, and are provided with reclining and easy chairs. They are 66.10 ft. long, weigh 78,000 lbs. and are equipped with two sets of six-wheel trucks.

BRIDGE BUILDING.

Buckhannon, W. Va.—At the last meeting of the county courts of Upshur and Randolph counties, W. Va., it was decided to build a steel bridge across the Middle Fork River, on the line of the Beverly and Buckhannon pike. The bridge is to be 200 ft. long with stone foundations. The Wrought Iron Bridge Co., of Canton, O., has the contract.

Cleveland, O.—Efforts to sell the \$285,000 worth of bridge repair bonds having failed at the first offering, they are to be put up again. The King Bridge Co. has been awarded the contract for the superstructure work for the new Brooklyn-Brighton bridge at its bid \$134,990. Nine bids were made altogether.

Columbus, O.—The County Commissioners will soon erect a bridge over the canal south of the city, where an old one was washed out last spring.

A new bridge is to be erected over the Scioto River, near Higby's, in Ross County. The Columbus Bridge Co. will continue work on the Leonard avenue viaduct. At one time it looked as though the contract would have to be relet.

Greensburg, Pa.—The Commissioners have contracted with the Shultz Bridge Co., of South Side, Pittsburgh, for the superstructure of the new bridges at Remaley's Mill and Jones' Mill. The company's bids were \$625 and \$1,460, respectively.

Harrisburg, Pa.—Several small bridges, one about 70 ft. long, will be built by the Philadelphia & Reading and citizens of Cumberland County between the former's Rossmoyne Station and Shiremanstown.

Hull, Que.—The Bridge Committee of the Hull City Council held a conference with Mayor Sylvain, of Gatineau Point, a few days ago. Arrangements are about concluded and tenders for the construction of the bridge across the Gatineau River will be called this month. The bridge when completed will cost \$10,000.

Indiana, Pa.—Murray Bros., of Blairsville, Pa., will erect new abutments for and add 10 ft. to the length of the county bridge over Crooked Creek, at Shelocta, at their bid of \$576.

Jeffersonville, Ind.—The Phoenix Bridge Co., which has the contract for the iron work for the new bridge over the Ohio River between Louisville and Jeffersonville, last week shipped the first consignment of ironwork since work was resumed on the bridge this year. About 150 carloads of bridge material have now been delivered at the bridge site.

Narrows, Ont.—The preparatory steps toward the erection of the new bridge to span the Trent River at the Narrows were taken last week. W. H. McKeel, of Campbellford, Ont., has the contract for the construction of the cofferdam, trestles and other woodwork, and is getting material together. The bridge will be 300 ft. in length with a draw of 112 ft.

Piedmont, W. Va.—The County Commissioners of Mineral County, W. Va., and Allegany County, Md., met in joint session last Friday and decided to build a bridge across the Potomac River between Piedmont and Luke, Md. The bridge is to be of steel, of three spans, and about 475 ft. in length. The estimated cost is \$13,000, but the extras which have been added will likely take it above that figure. The plans are being revised, and bids will be asked for in a few days. The Blue Bridge, over the same river, is to be practically rebuilt.

Richland, S. D.—The County Commissioners of Union County, Iowa, and Plymouth County, South Dakota, met in joint session last week and decided to build two bridges over the Sioux River. One is to be

built at Richland, and to cost \$2,000; the site for the other has not yet been decided.

Rigaud, Que.—Tenders are being received by Mr. E. Laronde, mayor of Rigaud, for the construction of an iron and steel bridge 120 ft. long, in the village of Rigaud.

Rocverte, W. Va.—The Chesapeake & Ohio has presented to the city council plans for an overhead crossing of Walnut street. It proposes to erect a bridge 274 ft. in length, the main span to be 64 ft. and the others 30 ft. each. The company asks the privilege of laying a second track along the street. The proposition will likely be accepted.

Rowlesburg, W. Va.—At a meeting of the County Court of Preston County, W. Va., held last week, a proposition was presented to build a steel or iron bridge across the Cheat River at Rowlesburg, but as funds were lacking the matter was postponed until next session. The plans for the bridge have been prepared and call for a structure which will cost about \$12,000.

Seattle, Wash.—The County Commissioners have contracted with the San Francisco Bridge Co. for the building of a bridge over Black River near Black River Junction. This contract is in place of one for building a bridge over Cedar River near Renton.

Stoney Point, Ont.—A special meeting of Tilbury North Council was held last week to consider the erection of a new bridge over the Big Creek.

Sunbury, Pa.—The townspeople are contemplating the erection of a free river bridge to cost \$100,000, the cost to be borne equally by Northumberland and Snyder counties.

Tamaqua, Pa.—The contract for the erection of a bridge over the Little Schuylkill River, at East Mauch Chunk street, has been awarded to Hernan Ribbe, of Lansford, at his bid of \$5,260, which also includes the removal of the old structure.

Toledo, O.—The Bridge Committee has decided to advertise for bids for building a bridge over the canal on Western avenue. City Engineer Miller is now completing plans for the structure, which will be of iron with a 16-ft. roadway and two sidewalks and will cost \$6,000.

Toronto, Ont.—Tenders are being received by James McDougall, C. E., Court House, Toronto, for the construction of two masonry bridge abutments on the River Humber in the village of Woodbridge; and also two masonry abutments on the River Rouge, in the village of Markham, Ont.

Velasco, Tex.—The County Commissioners will receive bids until Aug. 1 for building a drawbridge across Oyster Creek. Nearly 1,200 taxpayers have petitioned for an iron bridge at Churchill's Ferry on the San Bernard River.

Wawanesa, Man.—The Northern Pacific has offered to give \$500 toward the construction of a traffic bridge across the Souris River at this place, providing the proposed flour mill is built.

Westchester, Pa.—It is proposed to have a county bridge, to cost not more than \$10,000, erected over Crum Creek, near Strath-Haven Inn, to connect with the road to Wallingford. A Board of Viewers will be asked of the Delaware County Court.

Wheeling, W. Va.—Work on the new "back river" bridge of the Wheeling & Belmont Bridge Co. at this place is progressing nicely. The roof has been removed from the old wooden bridge, and one side closed to allow the masons to put in the new piers. The steel for the superstructure is on the ground and the work of erecting it will be commenced in a few days.

Williamsport, Pa.—Smith & Champion, of Mahanoy City, Pa., have secured the contract to repair the piers of the Market Street bridge, over the Susquehanna River, at their bid of \$5,718. Robbins & Perry, who supplied the plans and specifications, will superintend the work, which must be completed not later than Oct. 15. One of the piers will be entirely rebuilt.

MEETINGS AND ANNOUNCEMENTS.

Dividends:

Dividends on the capital stocks of railroad companies have been declared as follows:

Central Ohio, semi-annual, 3 per cent. on the common and preferred stocks, payable July 31.

Cincinnati, Hamilton & Dayton, quarterly, 1½ per cent., payable Aug. 3.

Great Northern, quarterly, 1½ per cent. on the preferred stock, payable Aug. 1.

Illinois Central, semi-annual, 2½ per cent., payable Sept. 1.

Lake Erie & Western, quarterly, 1½ per cent. on the preferred stock, payable Aug. 15.

Nashville, Chattanooga & St. Louis, quarterly, 1½ per cent., payable Aug. 2.

Pullman's Palace Car Co., quarterly, 2 per cent., payable Aug. 15.

St. Paul & Duluth, semi-annual, 3½ per cent. on the preferred stock, payable Sept. 1.

St. Paul, Minneapolis & Manitoba, quarterly, 1½ per cent., payable Aug. 1.

Terre Haute & Indianapolis, semi-annual, 3 per cent., payable Aug. 1.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Lake Shore & Michigan Southern, special, Cleveland, O., Aug. 2.

Velasco Terminal, annual, Velasco, Tex., Aug. 9.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *World's Congress of Engineers* in connection with the World's Fair will hold meetings in Chicago in the week commencing Monday, July 31.

The *American Society of Civil Engineers* will hold its summer convention in Chicago, in connection with the World's Congress of Engineers.

The *New England Roadmasters' Association* will hold its annual convention at the American House, Boston, Mass., Aug. 16 and 17.

The *American Association of General Passenger and Ticket Agents* will hold its next annual convention in Milwaukee, Wis., Sept. 19.

The *Railway Freight Claim Association* will hold its next annual convention at the Hotel Cadillac, Detroit, Mich., Aug. 9.

The *Master Car and Locomotive Painters' Association* will hold its next annual convention at Odd Fellows' Hall, Milwaukee, Wis., Sept. 13, 14 and 15. The headquarters of the Association will be at the Kirby House, corner of Mason and Water streets.

The *American Society of Mechanical Engineers* will hold its summer meeting in Chicago, commencing July 31.

The *Western Railway Club* meets in room 730, The Rookery Building, Chicago, on the third Tuesday in each month, at 2 p. m. The meetings have been adjourned to Sept. 19.

The *New York Railroad Club* meets at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, on the third Thursday in each month, at 7.30 p. m.

The *Northwest Railroad Club* meets at the Ryan Hotel, St. Paul, on the second Tuesday of each month, except during June, July and August, at 8 p. m.

The *American Society of Civil Engineers* meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month.

The *Boston Society of Civil Engineers* meets at Wesleyan Hall, Bromfield street, Boston, on the third Wednesday in each month, at 7.30 p. m.

The *Western Society of Engineers* meets at 78 La Salle street, Chicago, on the first Wednesday in each month, at 8 p. m.

The *Engineers' Club of St. Louis* meets in the Odd Fellows' Building, corner Ninth and Olive streets, St. Louis, on the first and third Wednesdays in each month.

The *Engineers' Club of Philadelphia* meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m.

The *Engineers' Society of Western Pennsylvania* meets at its rooms in the Thaw Mansion, Fifth street, Pittsburgh, Pa., on the third Tuesday in each month, at 7.30 p. m.

The *Civil Engineers' Club of Cleveland* meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The *Engineers' Club of Cincinnati* meets at the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati, O., on the third Thursday in each month at 8 p. m.

The *Engineers' Club of Kansas City* meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.

The *Engineering Association of the South* meets on the second Thursday in each month, at 8 p. m. The Association headquarters are at The Cumberland Publishing House, Nashville, Tenn.

The *Denver Society of Civil Engineers* meets at 36 Jacobson Block, Denver, Col., on the second and fourth Tuesdays of each month except during July, August and December, when they are held on the second Tuesday only.

The *Montana Society of Civil Engineers* meets at Helena, Mont., on the third Saturday in each month, at 7.30 p. m.

The *Engineers' Club of Minneapolis* meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

The *Canadian Society of Civil Engineers* meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday except during the months of June, July, August and September.

The *Technical Society of the Pacific Coast* meets at its rooms in the Academy of Sciences Building, 919 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The *Tacoma Society of Civil Engineers and Architects* meets in its rooms, 201 Washington Building, Tacoma, Wash., on the third Friday in each month.

The *Association of Engineers of Virginia* holds informal meetings the third Wednesday of each month, from September to May inclusive, at 719 Terry Building, Roanoke, at 8 p. m.

Master Car-Builders' Association.

The Rules of Interchange, as revised at Lakewood in June, and which are to go into effect on Sept. 1, 1893, are ready for distribution and they will be furnished at the same rates as heretofore, viz.: 25 copies, \$1; 50 copies, \$1.75; 100 copies, \$3. A less number than 25 copies at five cents per copy. Postage will be added in all cases when sent by mail. There will be no printing on the cover except "Revised, 1893," unless ordered and specified. In which case the additional printing on the cover will be charged additional at cost.

Master Car and Locomotive Painters' Association.

The twenty-fourth annual convention of this Association will be held at Milwaukee, Wis., on the 13th, 14th and 15th days of September, 1893, convening at 10 o'clock a. m. on Wednesday, the 13th.

The Kirby House (a new hotel), corner Mason and East Water streets, has been chosen as the headquarters of the Association, where special arrangements have been made by the local committee to accommodate at least 200 people. The rate for room and meals will be a uniform charge of \$2.00 a day for each person, two persons occupying one room. Rooms may be secured in advance of the meeting by addressing J. H. Carrothers, proprietor of the house. The convention will be held in Odd Fellows' Hall, directly opposite the hotel. A cordial invitation is extended to all foreman car and locomotive painters to attend the convention.

The following list of subjects has been prepared for discussion at the convention, with the names of the committees:

(1) Classification of paint shop repairs on passenger cars, F. S. Ball, Pennsylvania R. R., Altoona, Pa.; J. G. Keil, Chicago & Alton R. R., Bloomington, Ill.

(2) What is the best method of preparing cloth head lining for passenger cars, beauty and durability being the main consideration? C. W. Vonwolf, Ohio & Mississippi R. R., Washington, Ind.; Edward Webb, Laconia Car Company, Laconia, N. H.; M. L. A. Gardner, Wilmington, Columbia & Augusta R. R., Florence, S. C.

(3) Progress in car painting due to organized association, a paper by Robt. McKeon, New York, Lake Erie & Western R. R., Kent, O.

(4) What is the method of preparing a new steel tank for painting? How should the scales and rust be removed from a common iron tank? D. A. Little, Pennsylvania R. R. (Juniata shop), Altoona, Pa.; A. I. Horton, Lake Shore & Michigan Southern R. R., Elkhart, Ind.; and F. W. Wright, Michigan Central R. R. (C. S. Division), St. Thomas, Ont.

(5) The advantages, if any, which might accrue to the members of the Association by the appointment of a standing arbitration committee. J. A. Goben, Chesapeake & Ohio R. R., Huntington, W. Va.; A. J. Bruning, Louisville & Nashville R. R., Evansville, Ind.; A. J. Bishop, Cleveland, Cincinnati, Chicago & St. Louis Ry., Delaware, O.; and W. L. Marsh, Alabama Great Southern R. R., Birmingham, Ala.

(6) In cutting in a passenger car with body color, do you use it mixed the same way as when giving it a general painting? John A. Putz, Wisconsin Central Railroad, Stevens Point, Wis.; C. M. Lang, Old Colony Railroad, Taunton, Mass.; and F. Johnson, Chicago, Burlington & Quincy Railroad, Burlington, Ia.

(7) How should natural wood doors and sash be finished so as to best stand the action of the weather? W. W. Prahl, Southern Pacific Railroad, San Francisco, Cal.; E. A. Cole, J. G. Brill Car Co., Philadelphia, Pa.; and J. C. Smith, Cleveland, Cincinnati, Chicago & St. Louis Railway, Wabash, Ind.

W. O. Quest, Pittsburgh & Lake Erie Railroad, is President of the Association, and Robert McKeon, Kent, O., is Secretary.

PERSONAL.

—Mr. Charles F. Washburn, Vice-President of the wire manufacturing firm, the Washburn & Moen Manufacturing Co., died last Thursday in Boston.

—Mr. C. M. Schwab, General Superintendent of the Carnegie Steel Co., has sailed for Europe, and intends to visit the leading iron and steel works of Great Britain and Germany.

—Mr. N. H. Brown, for 10 years Chief Train Dispatcher of the St. Louis, Alton & Terre Haute, has been appointed Superintendent of Telegraph and Trainmaster of the Texas Central road.

—Mr. William Mackenzie has been appointed Traffic Manager of the Monterey & Gulf road in Mexico. Mr. C. K. Dunlap takes Mr. Mackenzie's place as General Freight and Passenger Agent of the Mexican International road.

—Mr. F. T. Kendall, Roadmaster of the Boston & Albany, with headquarters at Westfield, Mass., who has been in poor health for a long time, has resigned. Mr. Kendall has been connected with the Boston & Albany more than 40 years.

—Mr. J. L. Brown, formerly Master Mechanic of the Pittsburgh & Western, who was recently appointed to a responsible position in the Allegheny City government, was presented with a diamond stud and ring last week by his former subordinates.

—Mr. W. J. Wilgus has been appointed Assistant Chief Engineer of the Rome, Watertown & Ogdensburg. For the past few years he has been on the Chicago, St. Paul & Kansas City and Duluth & Winnipeg roads. His headquarters will be at Watertown, N. Y.

—Mr. W. E. Bailey, who was last week appointed Superintendent of the New England Division of the Philadelphia & Reading to succeed M. E. Blaine, is also Superintendent of Transportation of the Lehigh Valley & Hudson River road, and, it is said, will retain that position.

—Henry Gill, the Director of the Municipal Water-Works of Berlin, Germany, under whose supervision the works were built, died on June 17. Mr. Gill was one of Germany's most prominent engineers in that line, and a movement is already under way to erect a monument in his memory.

—Mr. Willis G. Clark, of Mobile, has been appointed Railroad Commissioner of Alabama, to succeed the late General Holtzclaw. He is a business man, and during President Cleveland's first administration was collector of the port of Mobile. For many years he has been a member of the Board of Trustees of the State University.

—Mr. C. H. Bosworth, of Springfield, Ill., has been appointed General Manager, and Robert M. Allen, General Freight and Passenger Agent of the North & South Railroad of Illinois, which is to be operated by the Receiver, R. J. Cavett, the lease of the Jacksonville Southern having been cancelled by the United States Court.

—Mr. I. W. Fowle has been appointed Master Mechanic of the Cincinnati, New Orleans & Texas Pacific, in charge of the shops at Ludlow, Ky., succeeding Mr. F. J. Zerbe, resigned. Mr. Fowle was formerly connected with the mechanical department of the Queen & Crescent, and was at one time Master Mechanic of the shops at Meriden, Miss.

—A number of resignations of officers of the Iowa Central Railroad were announced this week. Mr. A. F. Banks, who has been with the company since January, 1888, and has been Traffic Manager since 1890, has left the company's service and has been appointed General Freight Agent of the Elgin, Joliet & Eastern. Mr. H. A. Dugan, Purchasing Agent, and Mr. George N. Gish, Superintendent of Telegraph, have also resigned.

—First Vice-President Frank Thomson, of the Pennsylvania Railroad, sailed this week with his family from New York on the steamship "Paris," of the American line, for Southampton. He expects to be absent for several months. Though the trip is taken mainly for recreation Mr. Thomson intends to make careful studies of European railroad methods.

—Mr. James McQueen, Manager of the West Shore Fast Freight Line, is to be the Manager of the new Reading Despatch. The new line, it will be remembered, has been organized to handle the New York and Eastern freight business of the Grand Trunk, in consequence of the discontinuance of the traffic agreements heretofore existing between the Grand Trunk and the West Shore roads.

—A report that President Charles F. Mayer, of the Baltimore & Ohio, would resign before the next annual meeting, and would be succeeded by Mr. E. R. Bacon, President of the Baltimore & Ohio Southwestern road, was printed in some of the Baltimore newspapers this week. The officers of the company at once positively denied the truth of the report, and it didn't get a chance to make the usual circuit of the newspapers.

—William Garstang, Superintendent of Motive Power of the Cleveland, Cincinnati, Chicago & St. Louis, who recently went to Europe for his health, has sailed for New York. On his arrival in England he became much worse and was about to return home at once, but on the advice of President Ingalls he prolonged his stay in the hope that the change of climate would bring improvement. He did not grow better and decided to return home.

—Mr. Paul S. King, who was Chief Engineer of the Lehigh Valley extension to Buffalo during the entire period of construction, has retired, all of the construc-

tion work on the extension being now completed. He will spend the summer at the lakes in Central New York before again returning to active railroad service. Mr. J. Vanderhoeck, who has been connected with the line during its construction, has been made Division Engineer between Sayre, Pa., and Buffalo.

—Mr. L. A. Waugh has resigned as Superintendent of Motive Power and Machinery on the San Antonio & Aransas Pass road, and has accepted the position of Division Master Mechanic of the Gulf, Colorado & Santa Fe, at Cleburne, Tex. Mr. G. W. Butcher, foreman of locomotive repairs of the Southern Pacific, at Houston, Tex., has been appointed as Mr. Waugh's successor as Superintendent of Machinery on the San Antonio & Aransas Pass, with headquarters at San Antonio, Tex.

—Mr. D. D. Mayo, who has been acting as General Manager of the Denver & Rio Grande Express Co. since the resignation of Mr. G. W. Kramer, has received the appointment to that position. Mr. Mayo has been in the express business for 30 years. He removed to Colorado as a route agent in 1880. In the employ of the Adams Express Co. In 1882 Mr. Mayo was appointed Cashier of the Rio Grande Express Co., and in 1885 was made General Agent.

—Mr. Thomas Tobin, who was conductor of the freight train involved in the wreck at Montezuma, N. Y., in August, 1891, where 15 passengers were killed, has become insane and has been sent to the asylum at Ogdensburg, N. Y. Mr. Tobin was charged with manslaughter and had been tried twice, but had never been convicted. He had secured employment, but remorse over his connection with the wreck is said to have been the cause of his insanity.

—Mr. W. S. Rogers, M. Am. Soc. Mech. E., has accepted the position of General Manager for the Troy Valve Co., of Troy, N. Y. The company will make the Mobile, wedge, steam and water valve. Mr. Rogers will at once organize the shops and put in the machinery necessary for turning out the smaller sizes of valves, and will follow that up as rapidly as practicable with machinery for larger sizes. He has been for four years with M. C. Hammett, of Troy, and is well known to railroad officers, mechanical engineers and supply men all over the country.

—Mr. Charles Paine has been appointed a judge in the Transportation Department of the World's Columbian Exposition. Mr. Paine is eminently fitted to adorn this position. He is a Past-President of the American Society of Civil Engineers, was for many years General Superintendent of the Lake Shore & Michigan Southern, afterward General Manager of the West Shore during its construction and later Vice-President and General Manager of the Erie. In natural qualifications and in attainments he will be an ideal judge.

—Miss Charlie D. Field has been appointed Car Accountant of the Texas Central. As the correspondence received at her office has been coming in various styles, we have been requested to state that the name of the car accountant is not Mr. Charles D. Field nor Mrs. Charles D. Field. Miss Field is a strawberry blonde of pronounced type, and not only a capable car accountant but also an expert stenographer, typewriter and clerk, and has fairly earned her promotion by merit. In addition to her duties as Car Accountant she acts as Chief Clerk during the absence of the General Manager.

—Mr. John McVicker Dickey, General Superintendent of the Norfolk, Albemarle & Atlantic road, died at his home in Franklin, Pa., after a long illness. Mr. Dickey was born at Mauch Chunk, Pa., in 1827, but had lived at Franklin since 1872. He was one of the organizers of the Emlenton, Shipperville & Clarion Railroad and was Vice-President for some time. He was afterward Vice-President and General Manager of the Pittsburgh, Bradford & Buffalo Railroad and in 1883 became General Manager of the Norfolk & Virginia Beach Railroad, which has been re-organized as the Norfolk, Albemarle & Atlantic.

—Mr. John M. Osborn, Division Freight Agent of the Wabash road, died at his home in Toledo on July 23. He was born in Tonawanda, N. Y., in 1823, and began railroad work in 1850 as a clerk. Since then he has been at the heads of various departments on the Lake Erie & Western, the Cincinnati, Sandusky & Cleveland and the Atlantic & Western. In 1875 he became General Freight Agent for Toledo, Wabash & Western, and when that road became part of the Wabash he was made Division Freight Agent at Toledo, a place he held up to his death. He owned a farm of 2,500 acres at Fort Kearney, Neb., and other property.

—Mr. J. S. Graham, Master Mechanic of the Lake Shore & Michigan Southern at Cleveland, has resigned. Mr. Graham was formerly Master Mechanic of the road at Buffalo, and some years ago was transferred to Cleveland, being given charge of the division from that city to Erie and the Franklin branch. Mr. A. A. Burdeen, Master Mechanic of the Toledo Division, has been appointed to succeed him, with headquarters at Cleveland, and Mr. E. E. Eldon, formerly an engineer on the Buffalo Division, lately of Elkhart, Ind., has been appointed to succeed Mr. Burdeen, with headquarters at Norwalk, O., as previously noted.

—Mr. John B. Morford has been appointed Superintendent of the Canada Southern & Michigan Midland Division of the Michigan Central road and Mr. O. F. Jordan has been transferred from that division to the Middle Division, to fill the vacancy caused by the death of Mr. C. B. Bush. Mr. Morford's appointment as Superintendent of the Canada division is a reappointment, and brings him back to a division of the Michigan Central which he had managed with signal ability for many years. He resigned in June, 1892, on account of ill-health, and then went to Colorado. Mr. Jordan, who had been Roadmaster of the division for eight years, became Superintendent on Mr. Morford's resignation.

—Mr. David J. Mackey, of Evansville, Ind., was elected Chairman of the Board of Directors of the Evansville & Terre Haute road at a meeting of the Board in New York last week. Mr. Mackey has recently purchased considerable of the stock of this road, and it is now announced that with the holdings of his friends he owns a controlling interest in the company. Mr. F. W. Cook and Mr. E. P. Huston, of Evansville, have also been elected directors of the company. Mr. Mackey was formerly President of the road, but resigned in 1892. He is also President of the Louisville, Evansville & St. Louis Consolidated and of the Peoria, Decatur & Evansville railroads. Mr. G. J. Grammer, who was Traffic Manager under Mr. Mackey's former administration, and became President last fall after his resignation, will continue as President of the company, and it is announced that no important changes in the organization are contemplated.

ELECTIONS AND APPOINTMENTS.

Atchison, Topeka & Santa Fe.—The office of resident engineer at Topeka, which has been filled for the last 15 years by J. M. Meade, has been abolished and the jurisdiction of the engineer of the Chicago Division extended west of the Missouri River. Mr. Meade has been assigned to the Western Grand Division, which includes all lines in Kansas west of Dodge City and in Colorado, New Mexico and Texas. E. W. Grant, formerly of Topeka and recently resident engineer of Las Vegas, has been appointed assistant to Mr. Meade, with headquarters at La Junta, Col. These changes abolish the offices of four resident engineers.

Boston & Albany.—T. J. Sullivan has been appointed Roadmaster of the Taft Division, in place of F. T. Kendall, resigned. Mr. Sullivan has heretofore been Assistant Roadmaster.

Brooklyn Elevated.—W. A. Robinson, formerly Purchasing Agent and Assistant to the General Manager of the Cairo Short Line, and later Assistant to the General Manager of the St. Louis Southwestern, has been appointed Purchasing Agent and Assistant to the General Manager of the above railroad.

Chicago, Rock Island & Pacific.—Frank D. Stone, 17 Quincy street, Chicago, has been appointed Lumber Purchasing Agent of the road.

Dayton, Lebanon & Cincinnati.—The annual meeting of the company resulted in the election of George W. Lewis, Samuel Hunt, George B. Kerper, F. H. Alms and Walter St. John Jones, of Cincinnati, as Directors, and G. B. Harman, W. B. Callahan, W. Huffman and H. E. Talbott, of Dayton. The board was organized with Walter St. John Jones, President; Samuel Hunt, Vice-President, and James W. Montgomery, Secretary.

Duluth & Superior Belt Line.—The company elected officers at West Superior, Wis., as follows: President and General Manager, D. K. Smith; Vice-President, Thomas Krutz; Secretary and Treasurer, Joseph Modica.

Evansville & Terre Haute.—At a meeting of the company at No. 11 Wall street, New York, on July 26, T. W. Evans, H. I. Nicholas and Heman Clark resigned from the Board of Directors, and W. H. Tilford, H. M. Tilford, of New York, and E. D. Huston, of Evansville, Ind., were elected in their stead. C. C. Baldwin resigned as Chairman of the Finance Committee, and the Chairman of the Board of Directors of the road, D. J. Mackey, succeeded him.

Georgia Pacific.—In the United States Court at Birmingham, Ala., an order has been issued appointing Samuel Spencer Receiver in addition to F. W. Huidekoper and Reuben Foster.

Gulf, Beaumont & Kansas City.—The stockholders and directors of the railroad held their first meeting at Beaumont, Tex., on July 20. The directors are: E. E. Pratt, of Boston; N. D. Silsbee, of Boston; Edwin Hobby, W. A. Fletcher, J. H. Kirby, William Wiess and W. C. Averill. The officers are as follows: E. E. Pratt, President; John H. Kirby, Vice-President and General Manager; W. C. Averill, Secretary and Treasurer, and N. D. Silsbee, Assistant Treasurer.

Iowa Central.—A. F. Banks, Traffic Manager; George Fish, Superintendent of Telegraph, and A. R. Dugan, Purchasing Agent, have resigned.

Kingfield & Dead River.—The following have been elected officers of this company: Varnum B. Mead, 35 North Market street, Boston, Mass., President; F. J. D. Barnum, Lynnfield Center, Mass., Treasurer, and A. F. Hilton, Kingfield, Me., Chief Engineer. The list of directors was published in our issue of July 14.

Lehigh Valley.—J. Vanderhoeck has been made Division Engineer in charge of the road from Buffalo to Sayre, Pa. Louis H. Shearer has been made supervisor from Buffalo to Rochester Junction, M. Condon from Rochester Junction to Odessa, George Sullivan from Odessa to Sayre, and John Savage on the Ithaca branch.

Michigan Central.—O. F. Jordan has been appointed Superintendent of the Middle Air Line, Grand Rapids, South Haven, South Bend and Battle Creek divisions, vice C. B. Bush, deceased. Office, Jackson, Mich.

J. B. Morford has been appointed Superintendent of the Canada & Michigan Midland Divisions, vice O. F. Jordan, transferred. Office at St. Thomas, Ont.

Middle Georgia & Atlantic.—J. A. Droege having severed his connection with this company, the office of Superintendent has been abolished, and the duties assumed by the General Manager, W. B. Thomas, of Eatonton, Ga.

Missouri, Kansas & Texas.—H. A. Cherrier, formerly with the Queen & Crescent route, has been appointed Northern Passenger Agent of this road, with headquarters at Chicago, succeeding E. D. Spencer, resigned. W. C. Crush, for the past seven or eight years District Passenger Agent of the Louisville, New Albany & Chicago, at Louisville, Ky., has been appointed General Passenger Agent of this company's lines in Texas.

Monterey & Mexican Gulf.—William Mackenzie, formerly General Freight and Passenger Agent of the Mexican International, has been appointed Traffic Manager of this road, with office at Monterey, Mex.

New York, New England & Northern.—The directors of this company, organized in New York this week, are as follows: Archibald A. McLeod, Thomas C. Platt, James Armstrong, Pierre M. Brown, Alfred A. Gardner and Frank G. Odenheimer, of New York City; John B. McDonald, of Baltimore; William K. Niver, of Syracuse, N. Y., and John H. Taylor, of Bay Side, L. I.

The projectors met at 120 Broadway, New York, on July 25 and elected the following officers: President, A. A. McLeod; Vice-President, W. K. Niver; Secretary, F. G. Odenheimer. Directors: A. A. McLeod, J. B. McDonald, W. K. Niver, T. C. Platt, James Armstrong, Pierre M. Brown, A. A. Gardner, John Taylor and F. G. Odenheimer.

New York, New Haven & Hartford (Old Colony System).—C. A. McAlpine, Superintendent of the Northern Division, announces the following appointments: H. A. Ives, Superintendent's Chief Clerk; Geo. P. Snow, Chief Train Dispatcher; C. R. Haskins, Station Master, South Framingham, Mass.; G. F. Amadon, Freight Agent, South Framingham, Mass.; J. H. Fay, Supervisor of Bridges and Buildings. The maintenance of roadway and tracks will be under the direct supervision of W. E. Tuttle, Roadmaster; F. M. Sargent, Assistant.

North & South of Illinois.—C. H. Bosworth has been appointed General Manager, and Robert M. Allen,

General Passenger and Ticket Agent, both of Springfield, Ill. The appointments were made this week by R. J. Cavett, Receiver.

Pasadena & Mt. Wilson.—J. T. Whedon, formerly Superintendent of the Arkansas division of the Missouri Pacific, has been appointed Superintendent of Transportation and Traffic Manager of this road, with headquarters at Pasadena, Cal.

Philadelphia & Reading.—William Bailey, Trainmaster of the Mahoney Division, has succeeded M. E. Blaine as Superintendent of the New England Division, with headquarters at Hartford, Conn.

Pueblo, Gunnison & Pacific.—The annual meeting of the company was held in Pueblo, Col., July 22, at which the following directors and officers were elected: R. F. Weitbre, James N. Carlile, J. B. Orman, William Crook, T. T. Player, M. B. Thatcher, Robert Gibson, J. P. Martell and H. R. Holbrook, of Pueblo, Directors; T. T. Player, President; J. N. Carlile, Vice-President; C. Wilson, Treasurer; F. A. Townsend, Secretary, and H. R. Holbrook, Chief Engineer.

Red River Valley & Western.—This company formed last week with headquarters at Lynchburg, N. D., has the following incorporators: Frank Lynch and S. B. Bartlett, Casselton; H. F. Chaffee and W. R. Reed, Menia. Frank Lynch is President and H. F. Chaffee, Secretary and Treasurer.

St. Louis, Chicago & St. Paul.—The general offices of the company will be removed from Alton to Springfield, Ill., with the exception of the office of General Freight and Passenger Agent H. H. Ferguson. This order was made by the Court to the Receivers, C. E. Kimball and John Dickson.

St. Louis, Iron Mountain & Southern.—Edward J. Ward, for 14 years past Chief Clerk of the General Superintendent's Department, has resigned to enter business for himself, and C. E. Irwin, formerly Chief Clerk of the Department of Maintenance of Way of the "Big Four," has been appointed to succeed him.

San Antonio & Aransas Pass.—G. W. Butcher has been appointed Superintendent of Motive Power and Machinery with office at San Antonio, Tex. W. Greene has been appointed General Foreman of the shops at Yoakum, Tex.

Seaboard & Roanoke.—Maj. John C. Winder, General Manager and Vice-President of the Seaboard Air Line, has removed his headquarters from Raleigh to Norfolk, Va.

Texas Central.—Miss C. D. Field has been appointed Car Accountant of the Railroad, with office at Waco, Tex., to whom all movements, car tracers, etc., should be addressed.

RAILROAD CONSTRUCTION, Incorporations, Surveys, Etc.

Beech Creek.—Engineers are now surveying a route from Richmond, Indiana County, via Canoe Creek to Punxsutawney, Pa. A route has already been surveyed from Mahaffey to Richmond through a good coal field, and it is understood that the road is to be built through to Kittanning, connecting with the Allegheny Valley road.

Boston & Nova Scotia Coal & Railway Co.—Garson, Purser & Co., of St. Catharines, Ont., have been awarded the contract for building the road to be built by this company in Cape Breton, Nova Scotia, 18 miles in length.

British Columbia Roads.—During the last session of the British Columbia Legislature eight charters for railroads were granted. With one exception, these were for roads within the Kootenai District. Within the past five years 29 charters for railroads have been granted. Up to date, two of this number, the Shuswap & Okanagan and the Columbia & Kootenai have been completed. The Westminster Southern, forming a connection with the railroad system of the United States at Blaine, Wash., and now operated by the Great Northern, was constructed in 1890 on a charter granted in 1888. Six lines are now under course of construction, viz.: The Nelson & Fort Sheppard, from Nelson, in the Kootenai District, to the Washington boundary; the Revelstoke & Arrow Lake, and the Nakusp & Slokan, the former from Revelstoke, on the Canadian Pacific, south to the head of Arrow Lake, and the latter from Nakusp, on the southern end of the same lake, to the Slokan mining region, the two lines to be connected by a ferry for transporting the cars; the Kaslo & Slokan, on Kootenai Lake, to the Slokan mining region; the British Columbia Southern, from the Crow's Nest coal mines, south; the Victoria & Sidney, from Victoria to Sidney, in Saanich farming district; and the Burrard Inlet & Fraser Valley Railway, from Vancouver south to a connection with the Seattle, Lake Shore & Eastern at the boundary near Mission City, and crossing the Fraser River by bridge at New Westminster. This line is under control of the Northern Pacific. Of the projected lines the chief is the Canadian Western Central, now known as the British Pacific, and intended to extend from Victoria east to the boundary of the province. This charter has a land subsidy of 20,000 acres a mile. Negotiations have been in progress for the past year with American and European capital for the financing of the line. A part of the surveys on Victoria Island have been made, the intention on the mainland portion being to take generally the route surveyed by the Dominion Government for the Canadian Pacific route via Bute Inlet. Of the other numerous charters those of the Nicola Valley Co., from Spence's Bridge, on the Canadian Pacific, 50 miles to coal mines in the Nicola country; and the Chilliwack Railroad, from the Fraser Delta to Chilliwack, on the south side of the Fraser River, have both received guarantees of interest from the Provincial Government. The Canadian Pacific is surveying a line for a route through Crow's Nest Pass to Nelson, on Kootenai Lake. This will give the road an easier route through the mountains than the present line by the Kicking Horse and Roger's Pass.

Caldwell & Northern.—The tracklaying was begun a few weeks ago on this 15-mile road in Caldwell County, N. C. The line is being built from Lenoir to Wilson's Creek at Caldwell.

Central of New Jersey.—The newspaper report printed early in the spring that this company would build a new line from Perth Amboy along the Raritan River to Bound Brook, N. J., is again being pretty extensively circulated. The report is entirely without foundation. Surveys are being made near Perth Amboy to pottery works for a branch about two miles long, and this work is the probable basis for the story.

Chattanooga & Western.—The survey is reported to be in progress for this road north of Chattanooga, Tenn., and the officers state that contracts for construction work will probably be let in October. The route is from Chattanooga to Hixson, on the Cincinnati Southern, and thence northeast to Walden's Ridge, Tenn. The bridge at the crossing of the Tennessee River will be 2,600 ft. long. T. J. Nicholl, of Chattanooga, is President and Chief Engineer.

Cleveland, Wooster & Muskingum Valley.—Amendments of the charter have been filed at Columbus for the purpose of carrying out the provisions of a resolution adopted by the Board of Directors to extend the line beyond its previously designated terminus so that the northern terminus will be at Cleveland instead of Lodi, passing through the counties of Medina, Lorain and Cuyahoga. It also provides for a southern extension to Zanesville, O., from Wooster, and gives the directors permission to build a branch from a point in Holmes County to Cambridge, Guernsey County.

Concord & Montreal.—The North Weare branch extension from North Weare to Henniker, N. H., 6.6 miles, built in 1890, is now in operation by the company. The New Boston road from Parker's Station, Goffstown, to New Boston, N. H., 5.2 miles, is also open for business. The new line from Jefferson east to Berlin Falls, N. H., 21 miles, has been completed at a cost of about \$650,000, and is open for traffic the entire distance. The iron bridge carrying this branch over the Grand Trunk and the Androscoggin River at Gorham, N. H., is a particularly fine structure. The road now taps the territory of the Grand Trunk at Gorham and Berlin Falls. It is intended to extend the branch up the Androscoggin River about 20 miles to the heart of the lumber regions.

Deer Creek.—The incorporators of the company, composed of N. L. Mitchell, F. E. Gorrell, Edward Ferry, G. G. Street and O. M. Whitaker, are completing the organization and have opened the books for subscriptions to the stock. The road will be constructed between Belair and the Susquehanna River, near Havre de Grace, Md.

Dominion Coal Co.—This company has awarded the contract to McDonald & McManus, of Moncton, N. B., for a ten-mile section of railroad from the colliery at Glace Bay, through Cow Bay and "toward Louisbourg," to Cape Breton.

Dry Fork.—Chief Engineer John W. Moore, of this line, was in Elkins, W. Va., last Friday and stated that the grading would be commenced in August south of Bretz, W. Va. The surveys are all completed for 32 miles from the connection with the West Virginia Central & Pittsburgh at Bretz to the divide between Randolph, Pocahontas and Pendleton counties and nearly all the right of way has been secured. The line is to open the timber territory owned by the incorporators of the company. Robert Whitmer, of Philadelphia, is President.

Duluth & Iron Range.—The branch from McKinley, Minn., has been completed to Franklin, a town two miles beyond Virginia, the principal town in the Mesabi mining range. The line is nine miles long, and has been put in operation.

Duluth, Misabe & Northern.—The extension to the ore docks was finished on the 22d inst., and on that day the first trainload of ore from the Mesabi iron range was dumped into the pockets of the new docks. It consisted of 10 carloads of Bessemer ore from the Mountain Iron mine.

Duluth, South Shore & Atlantic.—The company has recently begun operating a spur track from Bay Mills to Waiska, Mich. This spur, 2½ miles in length, was built in 1891 for lumbering purposes only, but was constructed in a substantial manner. It was operated as a lumbering spur until last spring, when the business of Waiska warranted the company putting on a passenger train to connect with the main line trains. The bridge across the Waiska bay is 7,319 ft. in length, with a 32-ft. draw span for tugs and yachts.

Easton & Northern.—This road has been operated by the Bangor & Portland ever since it was opened for traffic, in 1890, between Nazareth and Easton, Pa., eight miles. The agreement, however, has only been a temporary one, and the Bangor & Portland is now negotiating for a permanent lease of the property through President C. Miller.

Ebensburg & Black Lick.—The work on this rail road from Ebensburg, Pa., to Coal Pit Run, 10 miles, is progressing very rapidly, and the grading will probably be completed about Aug. 1 next. The road is a branch of the Pennsylvania.

Escanaba Western.—A charter was filed at Lansing, Mich., last week, for a company of this name, with a capital stock of \$100,000, and with headquarters at Escanaba, Mich.

Fairmont, Morgantown & Pittsburgh.—Tracklaying on this line between Morgantown, W. Va., and Smithfield, Pa., is progressing rapidly. The Drake & Stratton Co., which has the contract, has a large force at work on the line, and expects to have the line completed within the next two months and ready for trains. The grading is all completed and the ties on the ground.

Galveston & Western.—The stockholders, at a special meeting at Galveston, voted in favor of issuing bonds for \$340,000 on the 17 miles of completed road in Texas, and also to increase the capital stock to \$2,000,000 to build lines north to Houston, west to San Antonio River, and other points.

Georges Valley.—The tracklaying will be commenced this week on this short Maine railroad. At present it is proposed to build eight miles from Warren station north to Union, with the prospect of continuing next year about 15 miles further.

The road has one pile bridge 140 ft. in length and one iron girder bridge 100 ft. long; the trestle crosses the Georges River and the iron bridge a mill stream at South Union. When the road is completed the rolling stock to be purchased will include one tank engine, one passenger, one combination and one smoking car; also a snow plow and two hand cars. James Mitchell is the contractor for building the railroad ready for operation. His headquarters are West Warren, Me.

Kingfield & Dead River.—McGregor Brothers, of Rumford Falls, Me., who have the contract for building 10 miles of this road in Maine, began work on July 22. The route is from Kingfield, Me., the terminus of the Franklin & Megantic road north to Drew's Mills. The route is through a broken and hilly country, but the engineers secured a direct line with easy grades and curves. Two streams, each about 140 ft. wide, are

crossed, and there are only a few other very short trestles. The gauge of the road is 2 ft. and 35-lb. rails will be used. The stock subscribed by the Maine Central and connecting roads and along the route amounts to \$30,000 and it is estimated that the line will be completed for less than \$35,000. V. B. Mead, of Boston, is President, and A. F. Hilton, of Kingfield, Me., is Chief Engineer.

Jacksonville Southeastern.—G. W. Chandler, the engineer in charge of the bridge now building across the Illinois River at Havana, Ill., reports that the work on the bridge is within six weeks of completion. As soon as the rails can be laid over the bridge tracklaying will be commenced on the west side toward Canton. The road was partly graded between Havana and Canton in 1892, the distance between the two points being 20 miles. The road bed will be repaired and the bridges on this section built by the time the track can be laid across the bridge at Havana. This extension has been surveyed as far as Rock Island on the Mississippi River, over 100 miles, but it is not proposed to do much work on the line beyond Canton this year.

Kingston, Smith's Falls & Ottawa.—The promoters of this railroad are meeting with satisfactory success in advancing the scheme, the municipalities along the route in Ontario responding readily to the demand for a subsidy to aid in its construction.

Klamath Falls & Northern.—William H. Mills, General Land Agent of the Southern Pacific system, with headquarters in San Francisco, recently visited Portland, Or., to arrange for the sale to local and Eastern capitalists of a large body of fine timber land lying between Medford, on the Southern Pacific's Oregon line, and Klamath Falls, Or. If the sale is consummated it will result in the construction, by the buyers, of a branch line connecting the Klamath Falls region with the Southern Pacific. Three lines have been surveyed, the most feasible of which is said to be that from Medford, Or., north and northwest to the course of the Butte River, via that valley and the foothills of Mt. Pitt, thence to Klamath Falls, traversing a distance of about 70 miles.

Lake Erie & Western.—The extension of this company's Minster Branch, 25 miles from Minster to Piqua, O., which has been proposed for several years, is receiving attention from the people along the proposed line this season, and the prospects of building are favorable. They have organized to purchase the right of way and they are progressing with that successfully and to the degree that is required of them to insure the building of the road. If free right of way is finally secured within a reasonable time, as required by the company, there will probably be little delay in beginning the construction of the branch. T. H. Perry, of Indianapolis, is Chief Engineer.

Mexican Railroads.—A City of Mexico dispatch states that the Mexican Government estimates the amount which will have to be paid in cash subsidies to new roads during the fiscal year from July 1, 1893, to June 30, 1894, at \$1,000,000. The following are the roads which the estimate includes: Merida to Campeachy, Northeast Railroad, Merida to Valladolid, Merida to Pata, Hidalgo Railway, Cordoba to Tuxtepec, Vera Cruz to Boca del Rio, and Maravoto to Iguala, eight in all. There are several roads now in course of construction to which no subsidies are attached, the principal of these being the Mexico, Cuernavaca & Pacific.

Montreal & Ottawa.—The contest with the Central Counties road to secure the subsidy of \$100,000 voted by the Ontario government has been decided in favor of this company, which is a branch of the Canadian Pacific. The Canada Atlantic road was interested in the success of the Central Counties line. The above company has agreed to begin work within a year on the line along the south shore of the Ottawa River to Ottawa. It is now completed and operated by the Canadian Pacific from Hudson near Vaudreuil to Point Fortune, Que., about 2½ miles. It is reported that part of the line between Point Fortune and Rigaud will be abandoned and the extension to Ottawa built along a new route.

Nelson & Fort Shepherd.—The members of Engineer E. L. McCoy's surveying party have returned to Spokane, Wash., having completed the location in British Columbia. They report that the bridge across the Pend Oreille River is now nearly completed, and the track will be laid across the bridge this week. The first 12 miles of grading above the river are about ready for the tracklayers, who expect to finish that much of the track the first week in August. The next 18 miles is to be finished by September. The road has a fair grade from Waneta to Nelson, B. C., although the first six miles is rather heavy. The country through which the road passes contains some fine timber and good agricultural land.

Newport & Sherman's Valley.—President and General Manager Gring states that there is hardly a doubt but that the work on the extension to Dry Run, Franklin County, Pa., will be begun this year. Considerable stock has been taken, but nothing will be done until the full amount required—\$40,000—is pledged by citizens along the route.

New Roads.—McSweeney Bros., railroad contractors of Texas, have been awarded the contract for constructing the railroad from the sugar plantation of Cunningham & Miller, in Fort Bend County, to Arcola, Tex., 18 miles. The contract calls for grading, bridging and tracklaying, and the work is to be completed and the road ready for operation by Nov. 4. This road is being built in order that the product of the sugar refinery may have railroad connections with the International & Great Northern and the Gulf, Colorado & Santa Fe at Arcola Junction.

New York, New England & Northern.—This company was incorporated in New York last week to construct a standard gauge railroad about 50 miles in length, from a point on the East River near the mouth of Leggett's Creek, in New York City, northerly through New York, Westchester and Putnam counties to a point on the line of the New York & New England Railroad, near Brewsters, in Putnam County. The capital is \$3,000,000, and the incorporators are President A. A. McLeod, of the New York & New England, and others interested in that railroad. Ryan & McDonald, of Baltimore, are reported to have the contract for building the road.

Norfolk & Western.—This company is building two more short lines from the Ohio River Extension to coal mines located on the North Fork of Elk River, belonging to the Indian Ridge and Ashland Coal companies.

Oakland & Confluence.—The preliminary steps have been taken for the organization of a company, composed largely of residents of Pittsburgh, Pa., and Garrett County, Md., for the purpose of building a 14-mile extension of the Oakland & Confluence road from the present terminus at Manor Lands south along the Youghiogheny River to Oakland, Md. The road now extends from a connection with the Pittsburgh & Connellsville Division of the Baltimore & Ohio at Confluence, Pa., south to Manor Lands, 20 miles. A meeting of those interested, being mostly promoters of the Oakland, Mountain Lake Park and Deer Park summer resorts, was held last week, and an engineer employed to go over the line and report on the cost. The proposal is to build the line and lease it to the Baltimore & Ohio. The object to be secured in building the road is to give a more direct route to passenger traffic between Pittsburgh and the West and the summer resorts mentioned above.

Pembroke Southern.—This company has been organized by the election of W. B. McAllister as President; Thomas Hale, Vice-President; Alexander Millar, Treasurer, and J. G. Forgie, Secretary. It is the intention of the company to build a road from Pembroke, Ont., to a point on the Ottawa, Arnprior & Parry Sound, now building west of Ottawa.

Pennsylvania.—A general order suspending or curtailing all new construction work in Pennsylvania was issued last week. It applies particularly to the work on the Pennsylvania Division, from Philadelphia to Pittsburgh, between which points the system was to be four-tracked. Much of the work has already been completed. Miles of the new third and fourth tracks have been laid in sections, and the grading for the additional tracks in some instances has progressed so far that all that is required to complete the work is to lay the ties and tracks. But for the time being the work will end here, as the company can readily handle its traffic with its present facilities, and it is deemed unwise to continue the heavy expense to which the company was subjected by new construction, when the additional facilities are not really required. The order also affects the construction work upon the new branch line which are being built, but not to the extent it does the main line work, as on the former it is only curtailed, while on the latter it is suspended. Only a few men are now working on the Philadelphia & Bustleton road, but, on the other hand, rapid progress is being made on the new Philadelphia & Delaware County line, and the finishing touches are being made to the Fort Washington branch, and the extensions of the Tyrone & Clearfield and the Hempfield branch, near Cowansburg, in Westmoreland County, Pa. Work is also being pushed forward rapidly on the Ebensburg & Black Lick, and on several short branches of the Cambria & Clearfield. Extensive surveys are being made in the Monongahela River Valley for an extension of the Pittsburgh, Virginia & Charleston, and routes are also being surveyed in Cambria, Indiana, Somerset and Westmoreland counties, but it is not likely any new work will be started on them for the present, although traffic is there awaiting shipment, as the projected lines will open new and rich bituminous coal territory.

The Fort Washington branch has been completed and regular passenger trains will commence running in a few days. This road extends from near Allens Lane station, on the Chestnut Hill Branch, to a point on the Trenton Cut-off near St. Thomas station, a distance of 5.99 miles, and stations have been established at the following points: Germantown Road, Ivy Hill, Laverock, Hill Crest and Arlington. This road, in addition to opening up a beautiful suburban territory, forms an alternate line to New York, via the Trenton Cut-off.

Philadelphia & Delaware County.—The contract for the grading, masonry and trestling on this branch of the Pennsylvania has been awarded to Charles A. Sims & Co., 267 South Fourth street, Philadelphia, as reported last week, and a force of about 200 men are now at work upon the line. It extends from a point on the P. & B. R. near Fernwood station to Newtown Square, Delaware County, Pa., a distance of about ten miles. The construction of this road has already greatly advanced the value of real estate at Newtown Square and other towns along the line, as the only means of transportation at present is a single omnibus leaving West Philadelphia once a day.

Philadelphia & Reading.—Owing to the stringency in the money market the work on the Philadelphia & Frankford branch has been suspended. The Reading Railroad owns the majority of the stock, and it was intended to complete the road to Frankford this fall. The route of the new line extends three miles from Frankford to Crescentville, where it connects with the Reading road. The suspension is only temporary.

Pittsburgh, Fort Wayne & Chicago.—The work of grading the second track between Massillon, O., and North Lawrence, five miles west, was discontinued last week. The double track has been completed and in use from Pittsburgh to Massillon, 107 miles.

Pittsburgh, Virginia & Charleston.—The surveys of this line, which is said to have been taken up by the Pennsylvania company, have been made from Brownsville, Pa., along the Monongahela River to lock No. 9, in West Virginia. These surveys have been made on both sides of the river, but it has not been decided which is the more favorable line.

Quebec & Lake St. John.—Several hundred men are still employed on the extension through the town of Chicoutimi, Que., to the steamboat wharf, where the permanent station is to be erected. At present the trains stop at the iron bridge over the Chicoutimi River, but they are expected to run to the wharf on the river in about a week's time. The formal inauguration is fixed for next month, and many of the provincial ministers are expected to be present at the ceremonies.

Red River Valley & Western.—This company has been formed, with headquarters at Lynchburg, N. D., to build from Addison, N. D., to the James River, a distance of 70 miles. The contract for the first 12 miles, from Addison west, has been let to Foley Bros. & Guthrie, of St. Paul, Minn. This section of the road is to be completed in time to carry the wheat crop to market. It will be operated by the Great Northern, serving as a feeder to it. Frank Lynch, of Casselton, is President.

Roaring Creek.—Maj. John W. Moore, who is Chief Engineer of the Dry Fork Railway Co., of West Virginia, has put a party of engineers on the preliminary line of this road, incorporated in West Virginia a few months ago to build a line from Elkins, on the West Virginia Central & Pittsburgh, to the headwaters of Roaring Creek. This scheme has now been partially merged into the Point Pleasant, Buckhannon & Tygart's Valley Railroad, the intention being to build a line from Buckhannon to Elkins, W. Va., along the valley of Roaring Creek.

St. Clair, Madison & St. Louis Belt Line.—A mortgage for \$2,000,000 on the property of the company was recorded at Alton, Ill., last week. The new bridge of the Chicago, Burlington & Quincy, now building at Alton, is being erected under the charter of this company. The charter also provides for a connecting railroad to the Bellefontaine Bridge across the Missouri River, also being built by the Burlington.

San Pete Valley.—The tracklaying is to begin in a few weeks on the extension to Mantle, San Pete County, Utah. This extension is 16 miles long from Chester south via Ephraim to Mantle. President Theodore Bruck is now in the East in connection with negotiations for completing the work. The grading has been completed and the ties are now being delivered. The branch will probably be completed in September and the rails will be laid by the company's men under the supervision of H. S. Kerr, Superintendent and Chief Engineer. The line has a maximum grade of 66 ft. to the mile and a maximum curvature of six degrees.

Seaboard & Roanoke.—A branch is to be built, it is reported, from Forestville, on the Raleigh & Gaston Division, to Ralesville, N. C., a distance of five miles, for the purpose of developing granite beds.

Southern Pacific.—J. P. Hughes, of Fort Worth, Tex., who has the contract for the grading and tracklaying on the Midland Branch of the Louisiana Western road, began work on July 17 and now has several hundred men employed. His contract is for a branch 21 miles long, extending northward from the main line on the Louisiana Western from near Crowley, La., at a point 174 miles west of New Orleans. The route is north through Acadia County, but there are no existing towns en route or at the terminal. The construction will be very light, the maximum grades being 20 ft. to the mile and the maximum curves 2 deg. E. B. Cushing, of Houston, Tex., is Engineer in Charge and J. A. Cottingham, of Crowley, La., is Division Engineer.

The new mileage built by this company for the first half of the present year has been 14 miles, on the following lines:

El Rio to Ymua, Ariz., construction on new location of main line, 5.32 miles; extension from Santa Margarita toward San Luis Obispo, Cal., 2.47 miles; Home Junction to Soldiers' Home (branch from Santa Monica branch), 2.97 miles; Burbank to Chatsworth Park, Cal., 3.14 miles, and on Santa Monica wharf, 0.22 miles.

The branch from Burbank to Chatsworth Park extends in a general westerly direction from Burbank, a distance of 21 miles, through the San Fernando Valley to Chatsworth Park, and the contractors are Turton & Knox, of Sacramento, Cal. The tracklaying commenced June 23, 1893, and up to date 11 miles has been laid. The work is light, with a maximum grade of 52.8 ft. a mile and the maximum curve is a 3 deg., excepting the turnout from the main line, which is made with a 10 deg. curve.

Tobique Valley.—This railroad was opened for traffic last week for the entire 28 miles extending from Perth, N. B., on the Canadian Pacific, northeast to Plaster Rock.

Toledo & Ohio Central.—This company expects to make arrangements with Columbus City authorities to use the river levee into the city for a roadbed, the company to keep the levee in repair as long as it uses it. In event that the arrangement is consummated, the road's freight and passenger stations will be west of the city.

Wheeling Bridge & Terminal.—The work of extending this road along the Ohio River from Wheeling to Benwood, W. Va., has progressed rapidly the past two weeks and the piling is nearly all driven. The piles at Boucks Run and between 34th and 37th streets in Wheeling, which are the heaviest parts of the work, are completed and the stringers laid. The contractors have two work trains at the junction with the Panhandle making a fill where the piling work has been used formerly. It is expected to have the road open for traffic within two months.

GENERAL RAILROAD NEWS.

Baltimore & Ohio.—The gross earnings for June are reported as \$3,157,366, an increase of \$61,727 as compared with the same month of last year, and net \$681,750, an increase of \$151,231. For the 12 months ending June 30 the gross earnings were \$26,030,955, an increase of \$183,597 as compared with the corresponding period of last year, and net \$7,114,644, a decrease of \$329,777. The earnings for June were the largest for that month in the history of the company. It is explained that the increases in operating expenses for the year are due to the losses incurred during January and February, owing to the severe weather. The increase in income from other sources than operation will, it is stated, more than offset the decrease in net earnings.

Duluth & Winnipeg.—This company has leased, for a term of five years, the tracks of the Superior Belt Line & Terminal Railway Co., with an option for the purchase, within one year, at the cost price of the property. The Belt Line extends from the Duluth & Winnipeg's company's ore docks on Alouez Bay, Duluth, to the bridge across the St. Louis River, and is used by the latter company in reaching its docks. The line is six miles in length, and, together with the terminal yards, is considered to be of considerable value.

Georgia Pacific.—In the United States Court at Atlanta, Ga., the attorney for the Central Trust Company has filed a bill to foreclose a \$14,500,000 mortgage on the Georgia Pacific Railroad. This is a part of the reorganization scheme of Drexel, Morgan & Co.

Georgia Southern & Florida.—The bondholders of the company have under consideration a plan to reorganize the company as follows: Five per cent. bonds for \$3,500,000 to be issued to retire \$3,420,000 six per cent., the difference of \$80,000 being used to cover the cost of the reorganization; four per cent. first income bonds for \$855,000, and five per cent. second income bonds to the amount of \$810,000, and \$4,000,000 of common stock; The Macon & Birmingham security holders to receive \$400,000 in first income and \$800,000 in common stock, and the Macon Construction Co. to receive \$400,000. The case of the bondholders who wish to obtain a decree of foreclosure and sale is set for this week.

Illinois Central.—The company reports gross earnings for the year ending June 30, 1893, of \$20,073,240, an increase of \$781,430 as compared with the previous fiscal year. The net earnings, after deducting operating expenses and taxes, were \$5,782,594, an increase of \$500,854.

Los Angeles & Pacific.—It is stated that the indebtedness of the company is now nearly all under control, and that arrangements will soon be made to put the road in operation again. This road has about 29 miles of track, and has not been in operation for about three years, caused by deficient traffic and inadequate terminal privileges at Los Angeles, Cal. The line extends directly west from Los Angeles to the sea front at Santa Monica. Now that this latter port has been made a port of entry, and in addition has greatly increased in popularity as a seaside resort, promise is therefore given of the road at once being able to realize good profits.

Macon & Northern.—Bondholders of this company considered the offer of Drexel, Morgan & Co. for the reorganization of the road in connection with the Richmond & Danville system at a meeting at Baltimore on July 22. About \$1,300,000 of bonds were represented at the meeting, which is more than a majority. Drexel, Morgan & Co. had offered this road 50 per cent. in preferred and 50 per cent. in the new common stock of the reorganized company on condition that the bonds be surrendered. The meeting decided to reject the proposition.

Nakusp & Stocan.—A general and special general meeting of the shareholders will be held in Victoria, B. C., Aug. 9, for the purpose of electing directors of the company, and for the purpose of obtaining the approval of the shareholders to an agreement for the leasing of the railroad when completed to the Canadian Pacific.

New York, Lake Erie & Western.—President John W. King and Mr. McCullough, Chairman of the Executive Committee, were appointed Receivers of the company this week by the United States Court at New York, in a friendly suit brought by a bondholder. The complainant, in his application for a Receiver, alleges that the floating debt incurred for wages, supplies, traffic balances and similar expenses is over \$5,000,000, and the company has been unable to renew the loans in which this debt is being carried by banks, trust companies and individuals. Included in this amount is over \$400,000 due to connecting lines that are pressing for immediate payment. A payment of \$240,000 on the lease of the New York, Pennsylvania & Ohio is due Aug. 31, and must be met to avoid forfeiture of the lease; other rentals are to come due from time to time, which cannot be met unless the company is protected from its floating debt.

North & South of Illinois.—The United States Circuit Court at Springfield, Ill., in the suit of several trust companies against the railroad, has made an order transferring this road back into the hands of the receiver, R. J. Cavett, by whom it was leased two years ago to the Chicago, Peoria & St. Louis (Jacksonville Southeastern). The road was formerly called the St. Louis & Chicago, and owns a line from Springfield to Mt. Olive, near Litchfield, Ill., 50 miles.

Stewiacke Valley & Lanstown.—The company has defaulted on the payment of its bonds in London. The road is built for about 12 miles in Nova Scotia. The charter is for a line 50 miles long, from a connection with the Intercolonial through the Stewiacke Valley.

Texas Central.—A mortgage was filed for record this week at Waco, Tex., in favor of the Farmers' Trust & Loan Co., of New York, trustees, under the recent issue of \$2,000,000 in bonds for improvements and extensions of the railroad. The proceeds of the bonds are to be used in extending the line northward from Albany to Haskell, to build from Dublin to Stephenville to the coal mines at Thurber, a distance of 40 miles, and also for effecting an entrance into Waco.

TRAFFIC.

Traffic Notes.

The Great Northern has made a contract with Samuel & Co., by which that firm will run a line of steamers between Seattle, Wash. and China.

The Massachusetts Railroad Commissioners have refused to authorize the Boston & Maine to run six passenger trains on each Sunday to Point of Pines, a seaside resort near Boston.

The Central Traffic Association has extended the time for stopping wheat, for milling-in-transit, to 90 days, this rule to apply on wheat delivered to the mills during July, August and September.

"A General Passenger Agent" tells an Indianapolis reporter that in that region mileage books were never so much abused as now. The non-transferable clause is ignored on all lines except the Louisville Division of the Pennsylvania.

Messrs. Thompson and Calder, agents of the Canadian Pacific in the State of Washington, who were indicted for selling a ticket over their road to a point in New England at less than tariff rates, have been held for trial in November.

The New Orleans Car Service Association is preparing to enforce demurrage on cars containing export freight in the same way that it is now being done at New York. It is also proposed at New Orleans to establish regular storage charges on freight in freight houses.

The Central of New Jersey is now carrying about 30 cars of oil daily from Parsons, Pa., to the Atlantic seaboard, the oil being received at Parsons through the United States Pipe Line from Athens, Pa. Athens is in Bradford County, about 70 miles northwest of Parsons.

The railroads of Colorado are carrying considerable numbers of men out of the state on charity passes, an arrangement having been made with certain county authorities to do this. It appears that many of these passengers are of very respectable character.

The Kings County Elevated road, in Brooklyn, N. Y., suffered a falling off in traffic during the month of June of about 3,000 passengers a day, in consequence, chiefly, of the establishment of an electric surface railroad parallel with the elevated in a number of important streets.

The Railroad Commissioners of Missouri have notified the express companies doing business in the state to file tariffs by Aug. 21, according to the Mabrey bill, recently passed. This bill gives the Commissioners substantially the same authority over express rates as over freight rates.

The Oregon Railroad Commissioners have ordered a reduction of freight rates from Portland to points in the southern part of the state, and it is said that the Southern Pacific has adopted the new tariff. To Ashland the first-class rate of \$1.53 has been reduced to \$1.27. Other reductions are in similar proportion.

The Nebraska roads are still discussing the new rate law of that State, principally the long and short haul clause of the bill, and trying to arrive at a conclusion whether roads having longer mileage to common points shall abandon those points to roads having shorter mileage. It is proposed that the Union Pacific, the Missouri Pacific and the Elkhorn abandon the business at Lincoln to the Burlington and the Rock Island. At Fremont, Norfolk and Humphrey the Elkhorn will take the business, while at Grand Island and short distance points on the Union Pacific it will be given to that road. By this means it is thought the roads will be allotted a fair proportion of the business of the state, and thus obviate the necessity of putting in the same rates from common points where one road has largely the best of the situation, so far as mileage is concerned. The date for the law to go into effect is Aug. 1.

The through passenger traffic over the lines of the Southern Pacific system for June was as follows:

	First class.	Second class.	Total.
Eastward.....	4,219	4,817	9,036
Westward.....	3,224	4,514	7,738
Totals.....	7,443	9,331	16,774

In the same month last year the number westbound was 7,557, and eastbound 6,627. The movement for the first six months of the year was as follows:

	1892.	1893.
Westward.....	46,997	41,182
Eastward.....	36,355	41,938

The movement eastward for June was expected to be larger than it was in May, whereas it was nearly 2,500 less, and even 300 less than for April. Probably the cutting of rates on the other lines drew off some travel from the Southern Pacific.

Chicago Traffic Matters.

CHICAGO, July 26, 1893.
Meetings of the Western Passenger Association were held last week Friday and Saturday, at which the attempt was made to unite on a plan for general reductions in World's Fair rates, but without success. A majority of the lines were in favor of making a round trip rate of one fare plus \$2 for all distances where the present 80 per cent. reduction does not make a less rate. The Santa Fe presented a minority report favoring the making of rates as above for all distances until the rate reaches \$14, after which the \$2 excess not to be added to the one-fare rate. No unanimous action seemed possible and an adjournment was taken with the matter still unsettled.

Reports from the meeting of presidents at New York last week do not indicate that much of anything was accomplished.

All agreements regarding passenger rates from Ohio River territory are apparently dead letters, and each line is scrambling for all the business it can get. Rates are quoted by all lines from Columbus as low as \$5 for the round trip, and new reductions are being announced daily.

While the public are undoubtedly holding off from coming to the Fair on the reasonable supposition that rates will be lower, still there is much doubt whether lower rates would greatly increase the travel. It appears to be more a lack of money than of satisfactory rates that is keeping people away.

Considerable talk is being indulged in with regard to the recent attempt of the President of the American Exhibitors' Association to arrange for the bringing of Western editors to the Fair by the wholesale, as an advertisement. The railroads promptly agreed to extend courtesies to the press, but when the Council of Administration of the Exposition was asked to issue free admissions to the ladies of the party it flatly refused, and the whole thing was given up.

Another complication has arisen through the alleged stocking of scalpers' offices here with tickets designed to cut the St. Louis rate. Tickets are on the market reading from Cleveland to St. Louis via Chicago, and purporting to be of Big Four issue. The route from Chicago is via the Illinois Central to Kankakee; Kankakee to East St. Louis via Indianapolis over the Big Four. They are freely offered at \$5 from Chicago to St. Louis, a scalp of \$1.50 on the St. Louis rate. The combination rate from Chicago to St. Louis via Indianapolis is \$12.

The shipments of eastbound freight, not including live stock, from Chicago, by all the lines, for the week ending July 22, amounted to 47,359 tons, against 50,257 tons during the preceding week, a decrease of 3,898 tons, and against 62,240 tons for the corresponding week last year. The proportions carried by each road were:

Roads.	W'k to July 22		W'k to July 15.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central.....	5,991	12.7	5,568	11.1
Wabash.....	2,283	4.8	3,162	6.3
Lake Shore & Michigan South.	9,621	20.1	8,986	17.9
Pitts., Ft. Wayne & Chicago..	5,795	12.3	6,559	13.0
Pitts., Cin., Chicago & St. Louis	5,913	12.5	5,592	11.2
Baltimore & Ohio.....	2,692	5.7	3,095	6.2
Chicago & Grand Trunk.....	3,153	6.6	3,450	6.8
New York, Chic. & St. Louis..	4,477	9.4	4,370	8.7
Chicago & Erie.....	5,376	11.4	6,453	12.8
C., C., C. & St. Louis.....	2,157	4.5	3,019	6.0
Totals.....	47,359	100.0	50,257	100.0

Of the above shipments 1,650 tons were flour, 12,056 tons grain and mill-stuff, 10,155 tons cured meats, 11,714 tons dressed beef, 2,490 tons butter, 1,674 tons hides and 4,606 tons lumber. The three Vanderbilt lines carried 37.7 per cent., the two Pennsylvania lines 24.2 per cent. The Lake lines carried 63,373 tons, against 78,468 tons during the preceding week, a decrease of 12,095 tons.

(Other Chicago traffic news will be found on page 570.)

The United States Supreme Court on Freight Rates.

The decision of the United States Supreme Court in the case of Union Pacific vs. Goodrich, just reported, holds that all shippers must be treated by carriers with absolute equality, and, according to a press dispatch, "distinctly recognizes the right of law-making bodies to regulate railroads by commissions, especially that feature of state and federal regulation which requires carriers to obtain permission of the commission before granting lower rates to persons and places." This case was brought under a statute of Colorado which prohibits unjust discrimination in practically the same language as that employed in the interstate commerce law. The same rate, \$1 a ton, was in effect to Denver from both Erie and Marshall, but while Erie coal paid the tariff rate, Marshall coal was only charged 60 cents a ton, a rebate of 40 cents from the schedule rate.

This case is discussed in the editorial columns.